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GE Healthcare

Technical Publications

Revision 1.0

Brivo XR118
DICOM CONFORMANCE STATEMENT

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CONFORMANCE STATEMENT OVERVIEW

This DICOM Conformance Statement captures the DICOM capabilitied of Brivo XR118 identified below.

Table 0.1 provides an overview of the network services supported by Brivo XR118.

Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	Yes	No
Digital X-Ray Image Storage – For Presentation	Yes	No
Digital X-Ray Image Storage – For Processing	Yes	No
Print Management		
Basic Film Session SOP Class	Yes	No
Basic Film Box SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Basic Grayscale Print Management Meta SOP Class	Yes	No
Printer SOP Class	Yes	No
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	No
Modality Performed Procedure Step SOP Class	Yes	No
Modality Worklist Information Model – FIND SOP Class	Yes	No

Option*: This means that this service can be purchased separately

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1. INTRODUCTION

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 (Introduction), which describes the overall structure, intent, and references for this Conformance Statement

Section 2 (Network Conformance Statement), which specifies the Brivo XR118 Mediacal System equipment compliance to the DICOM requirements for the implementation of Networking features.

Section 3 (Media Storage Conformance Statement), which specifies the Brivo XR118 Mediacal System equipment compliance to the DICOM requirements for the implementation of Media Storage features.

Section 4 (Digital X-ray Image Information Object Implementation), which specifies the Brivo XR118 Mediacal System equipment compliance to DICOM requirements for the implementation of a Digital X-ray Image Information Object.

Section 5 (Modality Worklist Information Model), which specifies the Brivo XR118 Mediacal System equipment compliance to DICOM requirements for the implementation of the Basic Worklist Management service.

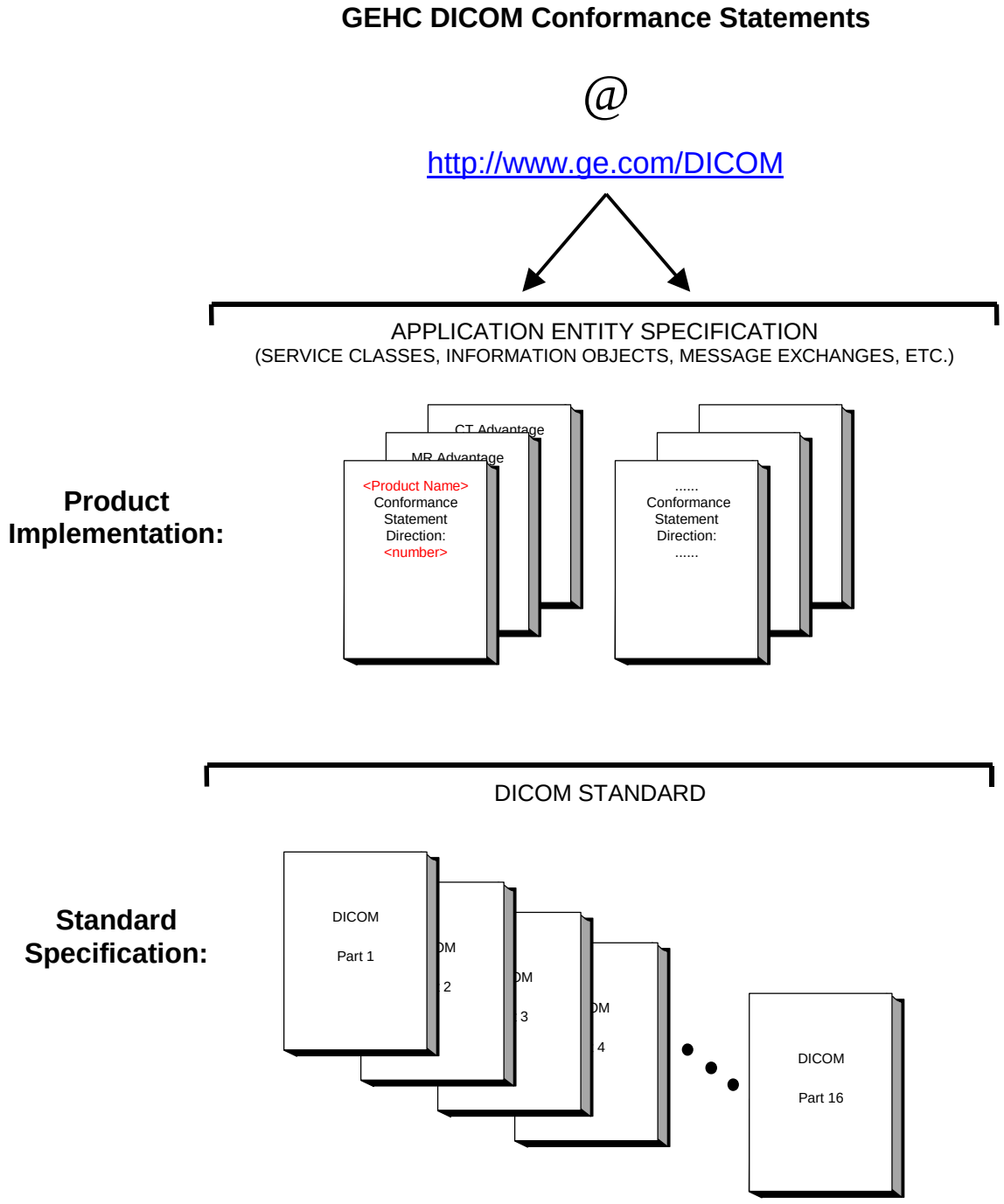
Section 6(Modalioty Performed Procedure Step Implementation), which specifies the Brivo XR118 Mediacal System equipment compliance to DICOM requirements for the implementation of the Modality Performed Procedure Step SOP Classes.

Section 7(Storage Commitment Push Model Implementation), which specifies the Brivo XR118 Mediacal System equipment compliance to DICOM requirements for the implementation of Storage Commitment Push feather.

Section 8(Print Management Implementation), which specifies the Brivo XR118 Medical Systems equipment compliance to DICOM requirements for the implementation of the Basic Print Meta SOP Classes (Grayscale).

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEHC DICOM Conformance Statements is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

Brivo XR118
Conformance Statement for DICOM

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1752
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts which are used in that Standard.

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information Object Definitions. For example, a GEHC CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements**. The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

- **Interaction** - It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 REFERENCES

NEMA PS3 — Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

1.7 DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitons of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives

DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs; USB Connected Removable).

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

1.8 SYMBOLS AND ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
CR	Computed Radiography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)

DNS	Domain Name System
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LDIF	LDAP Data Interchange Format
LUT	Look-up Table
MPPS	Modality Performed Procedure Step
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NTP	Network Time Protocol
O	Optional (Key Attribute)
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
R	Required (Key Attribute)
RDN	Relative Distinguished Name (LDAP)

RIS	Radiology Information System
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
VL	Visible Light
VR	Value Representation

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Brivo XR118 compliance to DICOM requirements for **Networking** features.

The details of DICOM networking conformance related to other Service Classes supported by this product are included in other sections of this DICOM Conformance Statement.

Brivo XR118 is an Integrated Digital X-ray Imaging System, and it provides the following DICOM functionalities:

- Send/Receive Echo message to/from DICOM Verfication SCP/SCU-Verification of application level communication.
- Export DICOM images to a DICOM Storage SCP(A remote DICOM system).
- Query DICOM Modality Worklist from a DICOM Worklist SCP.
- Study Management per MPPS
- Storage Commitment service to transfer ownership of images to a remote workstation supporting storage commitment such as an archive system.
- Print acquired images on a remote on a DICOM Printer-Hardcopies.

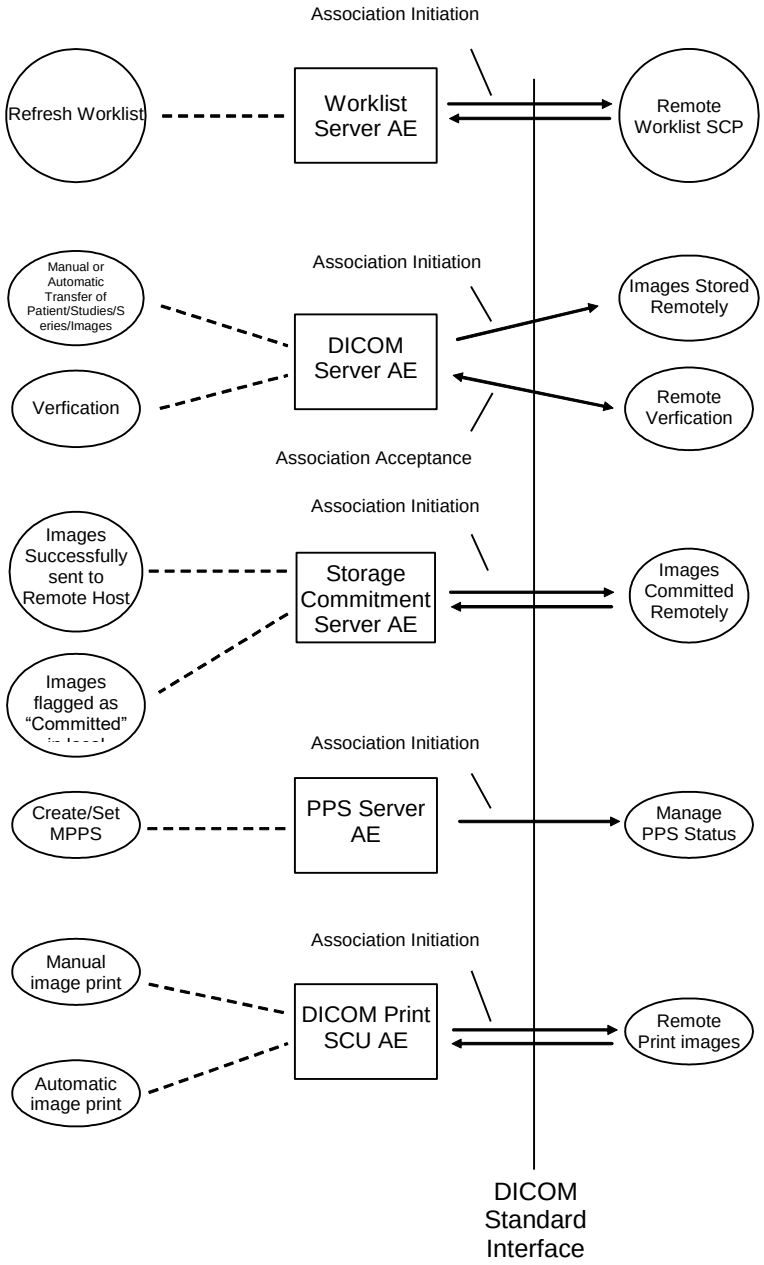
2.2 IMPLEMENTATION MODEL

2.2.1 Application Data Flow Diagram

The network application model for the Brivo XR118 is shown in the following Illustration :

ILLUSTRATION 2–1

BRIVO XR118 NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM



The product supports activity "Manual or Automatic Transfer of Patient/Study/Series/Images" which performs images storage and storage commitment functions; the results of that functionality are communicated to the Remote Store Server for images storage and storage commitment and after successfully get the commited

events from Remote Store Server the images will be flagged as “Committed” in local database.

The product supports activity “Print” which performs images print fuctions; The results of that functionalities sre communicate to Remote Printer for DICOM images print function.

The product supports activity “Verification” which requests verification of communication to a Remote DICOM AE by using the C-ECHO request primitive.

The product supports activity “Refresh Worklist” which performs Modality worklist query from remote Modality Worklist SCP server.

The product supports activity “Create/Set”: When the user begins the image acquisition process and generates the first image, the Workstation AE sends N-CREATE message to the configured MPPS SCP to indicate that the image acquisition process has been started for the requested procedure. The operator can close the acquisition session either by completing the acquisition process or discontinuing the ongoing scan. On closing the acquisition session, the Workstation AE sends N-SET message to the configured MPPS SCP to indicate the acquisition state of the requested procedure, with appropriate MPPS status (COMPLETED/DISCONTINUED).

2.2.2 Functional Definition of AE's

DICOM SERVER AE:

The DICOM SERVER Application Entity (AE) is an application that handles DICOM protocol communication. DICOM SERVER AE is automatically brought up when the Brivo XR118 system is powered on.

The DICOM SERVER AE is invoked by the following real-world activities:

- Manual Transfer of Patients/Studies/Series/Images from the Brivo XR118 to a Remote Host.

For this operation, the operator selects patients, studies, series or images on the console browser and then sends the selected patients, studies, seriesor images on to one or several remote DICOM AE by selecting the icon that represents the wanted remote DICOM AE.

All remote DICOM AE must be manually configured on the Brivo XR118 system by an

operator or by a field engineer.

The declaration of remote DICOM AE is done through the “NETWORK MANAGEMENT” under Utilities.

- Automatic transfer of Images from the Brivo XR118 system to a Remote Host.

For this operation, the transfer of images is triggered automatically. When Auto-Push is ON and Auto Tag is ON, all images generated during an acquisition session are automatically sent to the defined auto-push remote hosts when the user closes the exam. Only images that satisfy QualityCheck criteria are auto-pushed.

The default value of the Quality-Check is set bythe user through the Utilities > Preferences > IMAGE MANAGEMENT.

The setting of Auto-Push status (ON/OFF) and Auto-Push remote host is done through the Utilities > Preferences > "IMAGE MANAGEMENT".

The visualization of the transfer status is done on the Transfer Log window.

WORKLIST SERVER AE:

The WORKLIST SERVER AE is automatically brought up when the Brivo XR118 system is powered on.

The remote Worklist SCP must be manually configured on the Brivo XR118 system. The

configuration of remote Worklist SCP isdone through the UTILITIES > NETWORK CONNECTIONS.

The WORKLIST SERVER AE is invoked by the real-world activity Refresh Worklist.

For this operation, the user selects the REFRESH WORKLIST button of the Worklist screen in order to obtain latest modality worklist from the RIS. The WORKLIST SERVER sends a query defined by the user to remote AEs and returns the results to the user interface.

The WORKLIST SERVER AE initiates the following functions:

- Build the Worklist query according to the criteria defined by the user in the Query Definition Window.

- Send the query to Worklist Provider: Initiates a DICOM association with the Worklist Provider. If the remote Worklist Provider accepts a presentation context applicableto modality worklist, the WORKLIST SERVER AE issues a modality worklist query request via the C-FIND service.

STORAGE COMMITMENT SERVER AE:

The STORAGE COMMITMENT SERVER AE is automatically brought up when the Optima Brivo XR118 system is powered on.

To enable this operation on the on the Brivo XR118 system, the operator selects the host from the Network Host list and selects the Storage Commitment option. The host information has also to be filled out.

The STORAGE COMMITMENT SERVER AE is invoked by the real-world activity Images Successfully Sent to a Remote Host Supporting Storage Commitment.

The declaration of remote host supporting Storage Commitment is done on the NETWORK CONNECTIONS options.

When STORAGE COMMITMENT SERVER AE receives a successful commitment for images, it flags them as "Committed" in the local database.

The STORAGE COMMITMENT SERVER AE initiates the following operations:

- Initiate a DICOM association to ask a remote host (Storage Commitment SCP) storage commitment on specific images.

The STORAGE COMMITMENT SERVER AE waits for association requests from Remote Storage Commitment AE:

- Answer to DICOM associationstransmitting Storage Commitment Notification (N-EVENTREPORT)

PPS SERVER AE:

1. The PPS Server AE is implemented as an application process on the Acquisition host computer. It runs as a daemon serving requests from other applications to send the PPS information to the remote AE.

   To enable this operation on the Optima Brivo XR118 system, the operator selects the remote Worklist SCP from the Host list and enables MPPS option fromthe preferences.

2. The PPS Server AE initiates the following functions:

   - Start PPS
   - Complete PPS
   - Discontinue PPS

3. Start PPS: Initiates a DICOM association in order to create a DICOM Modality Performed Procedure Step SOP instance in the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the PPS Server AE will issue a request to create the SOP instance in the remote AE via the N-CREATE Service.

4. Complete PPS: Initiates a DICOM association in order to update a DICOM Modality Performed Procedure Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality Performed Procedure Step, the PPS Server AE will issue a request to update the SOP instance inthe remote AE via the N-SET service. The PPS Status is set to ‘COMPLETED’.

5. Discontinue PPS: Initiates DICOM associations in order to update a DICOM Modality Performed Procedure Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality Performed Procedure Step, the PPS Server AE will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to ‘DISCONTINUED’.

DICOM PRINT SCU AE

The DICOM Print SCU Application Entity (AE) is an application that handles DICOM protocol communication with Remote DICOM Printers. The DICOM Print SCU AE is activated when the user requests for a print or when automatic print is triggered at close exam time.

The DICOM Print SCU AE is invoked bythe following real-world activity:

- Manual Image Print

For this operation, the operator selects an image in the VIEWER, and then prints the image selecting the PRINT button. The operator may alsoinitiate a print by launching the scrapbook, loading an image, and selecting the PRINT button.

- Automatic Image Print

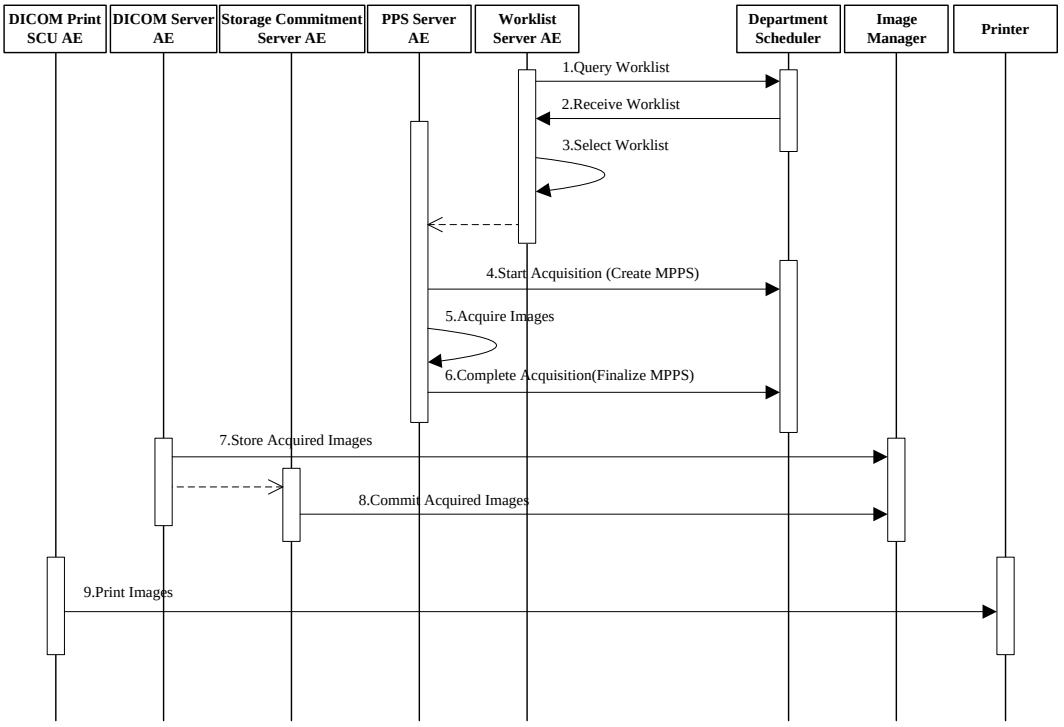
For this operation, user set Auto-Print ON. Then when the operator acquires images, images are automatically printed at Close Exam time.

In manual or automatic print, the PRINT MANAGER receives the “Simple print” request, composes a film then send the film to the selected Remote DICOM Printer.

The DICOM Print SCU AE supports the following functions:

- Access to pixel data in the local database.
- Initiate a DICOM association to send DICOM SOP classes (corresponding to the DICOM Print Management service class) to a remote DICOM Printer.

Sequencing of Real-World Activities



SEQUENCING OF REAL-WORD ACTIVITIES

1. Query Worklist
2. Receive Worklist of Modality Scheduled Procedure Steps (MSPS)
3. Select Workitem from Worklist
4. Start Acquisition and Create MPPS
5. Acquire Images
6. Complete Acquisition and Finalize MPPS

7. Store Acquired Images

8. Commit Acquired Images

9. Print Images

Other workflow situations (e.g. unscheduled procedure steps) will have other sequencing constraints.

Printing could equally take place after the images have been acquired. Printing could be omitted completely if no printer is connected or hardcopies are not required.

2.3 AE SPECIFICATIONS

2.3.1 DICOM Server AE Specification

The DICOM Server Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU** and/or as an **SCP**:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

2.3.1.1 Association Establishment Policies

2.3.1.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the DICOM Server AE is:

Maximum Length PDU	28Kbytes

The SOP class Extended negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 18.

The user information Items sent by this product are:

• Maximum PDU Length

• Implementation UID

2.3.1.1.2 Number of Associations

The DICOM Server AE will initiate a maximum of 2 simultaneous associations to remote nodes.

The DICOM Server AE will support a maximum of 1 simultaneous associations initiated by remote nodes.

2.3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Brivo XR118 system Implementation UID	**1.2.840.113619.6.383**
Brivo XR118 system Implementation Version Name	**Brivo XR118**

2.3.1.2 Association Initiation Policy

When the DICOM Server Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The DICOM Server proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.1.2.1 Real-World Activity- *Manual transfer of patients/studies/series/images*

2.3.1.2.1.1 Associated Real-World Activity

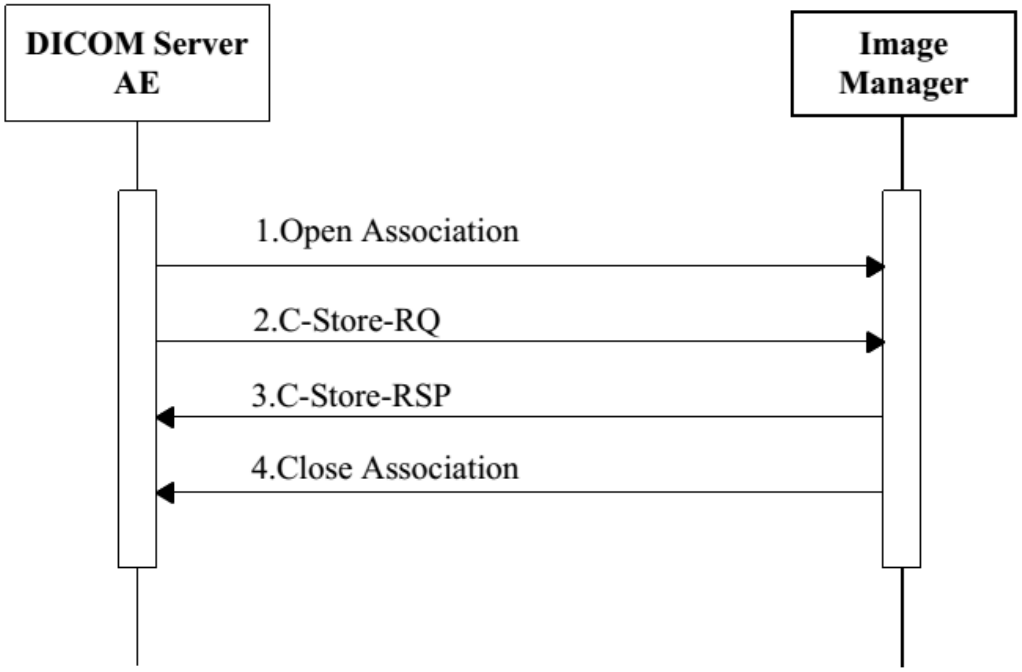
The operator does the following:

I. Select in the BROWSER one or several Patient Folders (or Studies/Series/Images) to be sent.Then select the Remote DICOM AE displayed as an icon among the configured destination nodes. This operation will cause:

II. The Brivo XR118 system to retrieve the selected images from its local database.

III. The DICOM SERVER AE to initiatea DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.

IV. To emit C-STORE command to send the images, if the negotiation is successful.



Sequencing Of Real-Word Activity

A possible sequence of interactions between the DICOM Server AE and an Image Manager (e.g. a storage or archive device supporting the Storage SOP Classes asan SCP) is illustrated in the Figure above:

1. The DICOM Server AE opens an Association with the Image Manager

2. Acquired images are transmitted to the Image Manager using a Storage request (C-STORE) and the Image Server replies with a C-STORE response (status success).

3. The Storage SCU AE closes the Association with the Image Server.

2.3.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Manual transfer of patients/studies/series/images					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for All Storage SOP Classes

The DICOM Server AE includes optional data elements in the SOP Instances as described in Sections 4.

Following are the status codes that are more specifically processed when receiving messages from a **Storage** SCP equipment :

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code	Related Fields Processed if received
Failure	A700-A7FF	Refused: Out of resources	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
	A900-A9FF	Error: Data Set does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	C000-CFFF	Error: Cannot Understand	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	0122	SOP Class Not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)

Warning	B000	Coercion of Data Elements	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	B006	Elements Discarded	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	B007	Data Set does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
Success	0000			None

2.3.1.2.1.2.2 SOP Specific DICOM Conformance Statement for the Digital X-Ray Image Storage SOP Classes

See Section 2.3.1.2.1.2 "SOP Specific DICOM Conformance Statement for All Storage SOP Classes" for details on general Storage Service SCU processing also applicable to the Digital X-Ray Image Storage SOP Classes.

As described earlier, when the operator selects one or several images to be sent to a remote host, the DICOM SERVER AE initiates a DICOM association and negotiates with the Remote AE an appropriate Abstract and Transfer syntax.

If the images to be sent are Digital X-Ray For Processing Image, the Remote AE has to accept one of the following proposed presentation context:

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

If the images to be sent are Digital X-Ray For Presentation Image, the Remote AE has to accept one of the following proposed presentation context:

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		

Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

If the Remote AE does not accept any of the above Proposed Presentation Context according to the image type, but accepts one of the Presentation Context of the table below, then the image of type Digital X-Ray (DX) For Processing or For Presentation will befallback into an image of type Computed Radiography (CR) before being sent to the Remote AE.

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

The produced image after fallback from DX to CR, will contain the attributes definedin the DICOM Standard for CR SOP and all attributes that can be found in the original image as the extended IOD for CR is supported.

The modules that are specific to a CR image (CR Series and CR Image module) will be filled and some of the modules that are common to both IODs (Patient, General Study, General Series, General Image, SOP Common, etc.) will be modified. Every field added or modified is detailed:

CR Series module:

Attribute name	**Tag**	**Type**	**Attribute description**	**Conversion Rule**
Body Part Examined	(0018,0015)	2	Text description of the part of the body examined	If it not present in the original image, it will be added and set to zero length value If it is present in original image, it will keep the same value.
Filter Type	(0018,1160)	3	Label of the type of filter inserted into the X-Ray beam	Same value as in the original image (may be zero length or absent)
Collomator	(0018,1180)	3	Lable describing any grid inserted	Not sent (Never present in original image)
Focal Spot	(0018, 1190)	3	Size of the focal spot in mm. For devices with variable focal spot or multiple focal spots, small dimension followed by large dimension.	Same value as in the original image (may be zero length or absent)
Plate Type	(0018,1260)	3	Label of the type of storage phosphor plates used in this series	Not sent. (Never present in original image)
Phosphor Type	(0018,1261)	3	Label of type of phosphor on the plates	Not sent. (Never present in original image)

View Position	(0018,5101)	2	Radiographic view associated with Patient Position (0018,5100)	If it is not present in the original image, it will be added and set to zero length value.If it is present in original image, it will keep the same value.

CR Image module:

Attribute name	Tag	Type	Attribute description	Conversion Rule
KVP	(0018,0060)	3	Peak kilo voltage output of the x-ray generator used	Same value as in the original image (may be zero length or absent)
Plate ID	(0018,1004)	3	The ID or serial number of the sensing plate upon which the image was acquired.	Not sent. (Never present in original image)
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center	Same value as in the original image (may be zero length or absent)
Distance Source to Patient	(0018,1111)	3	Distance in mm from source to tabletop	Same value as in the original image (may be zero length or absent)
Exposure Time	(0018,1150)	3	Time of X-ray exposure in mSec	Same value as in the original image (may be zero length or absent)
X-Ray Tube Current	(0018,1151)	3	X-ray tube current in mA	Same value as in the original image (may be zero length or absent)
Exposure	(0018,1152)	3	The product of exposure time and X-ray tube current expressed in mAs	Same value as in the original image (may be zero length or absent)
Exposure in mAs	(0018,1153)	3	The product of exposure time and X-ray tube current expresses in mAs	Same value as in the original image (may be zero length or absent)
Imager Pixel Spacing	(0018,1164)	3	Physical distance measured at the tabletop between the center of each projected image pixel, specified by Row dimension and Column dimension	This value does not always equal Detector Element Spacing.Imager Pixel Spacing = Detector Element Spacing * (Distance Source to Tabletop/Distance Source to Detector)
Generator Power	(0018,1170)	3	Power in kW to the X-ray generator	Not sent. (Never present in original image)
Acquisition Device Processing Description	(0018,1400)	3	Describe device-specific processing associated with the image	Same value as in the original image (may be zero length or absent)
Acquisition Device Processing	(0018,1401)	3	Code representing the devicespecific processing associated with the image.	Same value as in the original image (may be zero length or absent)

Code				
Cassette Orientation	(0018,1402)	3	Orientation of Cassette.	Not sent. (Never present in original image)
Cassette Size	(0018,1403)	3	Size of Cassette	Not sent. (Never present in original image)
Exposures on Plate	(0018,1404)	3	Total Number of X-ray exposures that have been made on the plate identified in Plate ID (0018,1004)	Not sent. (Never present in original image)
Relative XRay Exposure	(0018,1405)	3	Relative X-ray exposure on the plate. Meaning of values is implementation specific.	Same value as in the original image (may be zero length or absent)
Sensitivity	(0018,6000)	3	Read out sensitivity	Same value as in the original image (may be zero length or absent)

General Study module:

The attributes of the General Study module - including the Study Instance UID (0020,000D) and the Study ID (0020,0010) - will be equal to those in the original image.

General Series module:

The attributes of the General Series module will be equal to those in the original image, except:Modality (0008,0060): Set to CR.

Series Instance UID (0020,000E): As a DICOM series can only contain objects with the same modality, a new UID should be created.

Laterality (0020, 0060): Set according to the value found in Image Laterality (0020,0062) of the original image.

L in Image Laterality (0020,0062) => L in Laterality (0020, 0060)

R in Image Laterality (0020,0062) => R in Laterality (0020, 0060)

U or B in Image Laterality (0020,0062) => Laterality (0020,0060) is absent

General Equipment module:

The attributes of the General Equipment module will beequal to those in the original image.

General Image module:

The attributes of the General Image module will be equal to those in the originalimage except:

Image Type (0008,0008): The two first values of this multi-values attribute will always be ORIGINAL (pixel values are based on original data) and SECONDARY (image

created after the initial patient examination). The third and later values are provided if present in the original image.

Derivation Description (0008,2111): this attribute will be created and will contain CR Fallback.

Ref Image Sequence (0008,2112): This sequence will be in the General Image module. It will be composed of one item containing the SOP class and SOP Instance UIDs of the original image.

Image Pixel module:

The attributes of the Image Pixel module will be equal to those in the original image.

SOP Common module:

Attribute name	Tag	Type	Attribute description	Conversion Rule
Specific Character Set	(0008,0005)	1	Character Set that expands or replace the Basic Graphic Set.	Same value as in the original image (ISOIR_100)
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created	Not sent. (Never present in original image)
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created	Not sent. (Never present in original image)
Instance Creator UID	(0008,0014)	3	Uniquely identifies the device which created the SOP Instance	Not sent. (Never present in original image)
SOP Class UID	(0008,0016)	1	Uniquely identified the SOP class	Set to 1.2.840.10008.5.1.4.1.1.1
SOP Instance UID	(0008, 0018)	1	Uniquely identified the SOP Instance	New UID is generated

2.3.1.2.2 Real-World Activity- *Automatic transfer of patients/studies/series/images*

2.3.1.2.2.1 Associated Real-World Activity

The operator does the following:

I. Set Auto-Push ON, select Auto-Push remote hosts, and set the default setting for Quality Check (“OK to send” or “Not OK to send”).

II. Start an exam and acquire images and close the exam.

III. Set the Quality Check flag as desired for each image. Configurable feature with two choices;

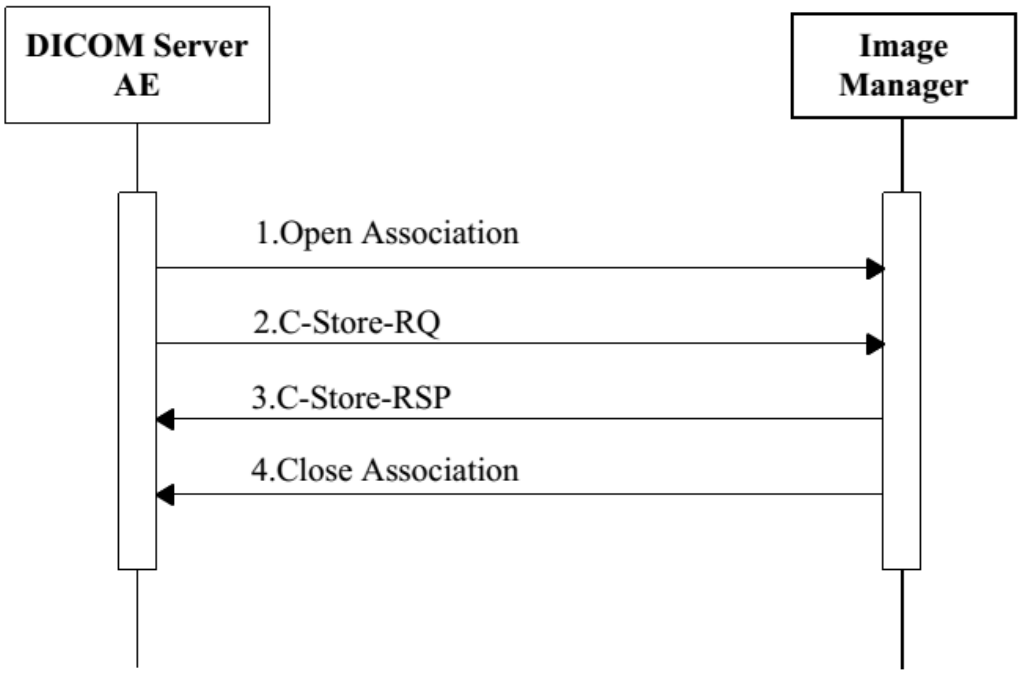
IV. QC defaulted to OK, QC defaulted to NOT OK.

V. Close the exam.

This operation will cause:

I. The DICOM SERVER AE to initiate a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.

II. To emit C-STORE command to send the "OK to send" images, if the negotiation is successful



Sequencing Of Real-Word Activity

A possible sequence of interactions between the DICOM Server AE and an Image Manager (e.g. a storage or archive device supporting the Storage SOP Classes asan SCP) is illustrated in the Figure above:

1. The DICOM Server AE opens an Association with the Image Manager

2. Acquired images are transmitted to the Image Manager using a Storage request (C-STORE) and the Image Server replies with a C-STORE response (status success).

3. The Storage SCU AE closes the Association with the Image Server

2.3.1.2.2.2 Proposed Presentation Context Table

Same as real-world activity Manual Transfer of Patients/Studies/Series/Images.

2.3.1.2.2.2.1 SOP Specific DICOM Conformance Statement for All Storage SOP Classes

Same as real-world activity Manual Transfer of Patients/Studies/Series/Images.

2.3.1.2.2.2.2 SOP Specific DICOM Conformance Statement for the Digital X-Ray Image Storage SOP Classes

Same as real-world activity Manual Transfer of Patients/Studies/Series/Images.

2.3.1.2.3 Real-World Activity- *Verification(C-Echo) SCU*

2.3.1.2.3.1 Associated Real-World Activity

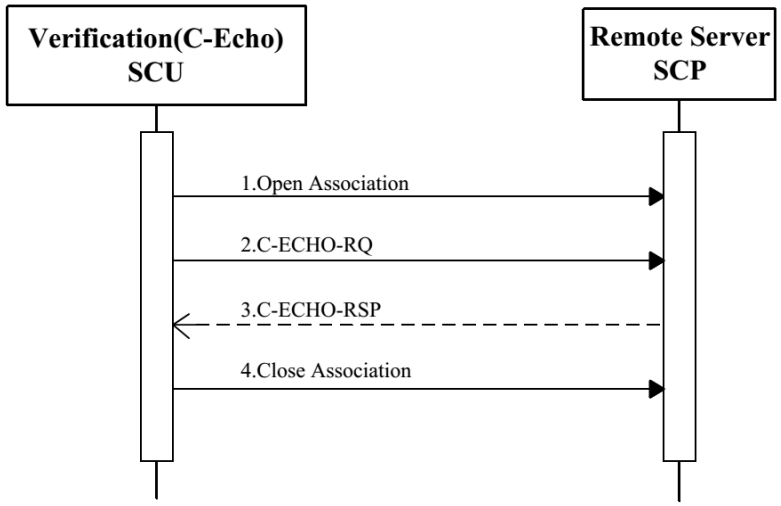
The operator does the following:

I. Enter the SUIF screens on the IUI.

II. Select “Config” button, and then select “C-ECHO” button.

III. Select the DICOM Device to C-ECHO and press the Initiate C-ECHO button.

IV. Display is updated with status of the C-ECHO. Success or Failure is displayed to the user.



SEQUENCING OF ACTIVITY – VERIFICATION

A possible sequence of interactions between the DICOM Server AE and an Remote Server (e.g. a storage or archive device supporting the Storage SOP Classes as an SCP) is illustrated in the Figure above:

1. The DICOM Server-SCU AE opens an association with the Remote Server

2. The DICOM Server-SCU AE issues a verification request (C-ECHO) and the Remote Server replies with a C-ECHO response (status success).

3. The DICOM Server-SCU AE closes the association with the Remote Server.

2.3.1.2.3.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Verification SCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.1.2.3.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Classes

Brivo XR118 provides standard Conformance to the DICOM Verification Service Class.

2.3.1.3 Association Acceptance Policy

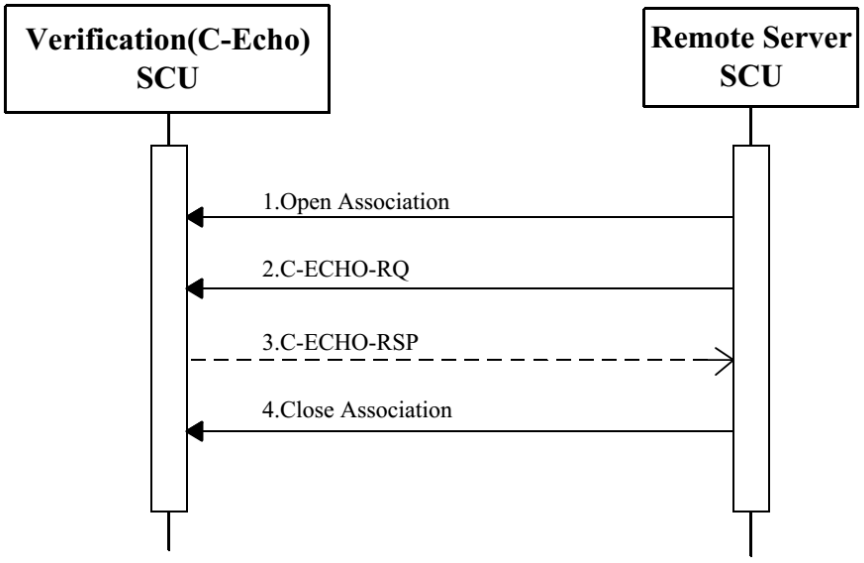
2.3.1.3.1 Real-World Activity *Verification(C-Echo) SCP*

2.3.1.3.1.1 Associated Real-World Activity

The operator does the following:

I. A Remote DICOM Device initiates a C-ECHO.

II. The DICOM Server AE negotiates a transfer syntax and responds to the CECHO request with the appropriate status.



SEQUENCING OF ACTIVITY – VERIFICATION

A possible sequence of interactions between the DICOM Server-SCP AE and an Remote Server (e.g. a storage or archive device supporting the Verification SOP Classes as an SCU) is illustrated in the Figure above:

1. The Remote Server opens an association with the DICOM Server-SCP AE.

2. The Remote Server issues a verification request (C-ECHO) and the DICOM Server-SCP AE replies with a C-ECHO response (status success).

3. The Remote Server closes the association with the Verification-SCP AE.

2.3.1.3.1.2 Accepted Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Verification SCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Classes

Brivo XR118 provides standard Conformance to the DICOM Verification Service Class.

Following are the status codes the Application may send back to the SCU Equipment after

performing the requested:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code	Related Fields Processed if received
Success	0000		Operation Performed properly	None

2.3.2 Worklist Server AE Specification

The Worklist Server Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU**:

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

2.3.2.1 Association Establishment Policies

2.3.2.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the Worklist Server is:

Maximum Length PDU	28Kbytes

2.3.2.1.2 Number of Associations

The Worklist Server will initiate a maximum of 1 simultaneous associations to remote nodes.

2.3.2.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.2.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Brivo XR118 system Implementation UID	1.2.840.113619.6.383
Brivo XR118 system Implementation Version Name	Brivo XR118

2.3.2.2 Association Initiation Policy

When the Worklist Server Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The Worklist Server proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.2.2.1 Real-World Activity -*Worklist Query*

2.3.2.2.1.1 Associated Real-World Activity

The operator of the system initiates a query for a modality worklist by pressing the REFRESH WORKLIST button of the Worklist screen. The Worklist Server will then initiatean association with the remote AE in order to query for the worklist A user can configure a number of parameters that directly control the worklist query request. The usercan request worklist items that are intended for the system the user is working at, all items that apply to the modality of the system the user is working at or all worklist items

available. These selections and their affects on worklist query parameters are given below:

This system:

- Modality, (0008,0060) - set to DX
- Scheduled Station AE Title, (0040,0001) - set to Query AE title

All systems:

- Modality, (0008,0060) - zero-length (universal matching)
- Scheduled Station AE Title, (0040,0001)- zero-length (universal matching)

The scheduled dates of procedures of interest can bespecified for query by selecting a specific date range. The date ranges available are Today, Tomorrow or between two given dates. These selections and their affects on worklist query parameters are given below:

Today:

Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDDYYYYMMDD, where YYYYMMDD is the current date.

Tomorrow:

Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDDYYYYMMDD, where YYYYMMDD is tomorrow date.

Between 2 dates:

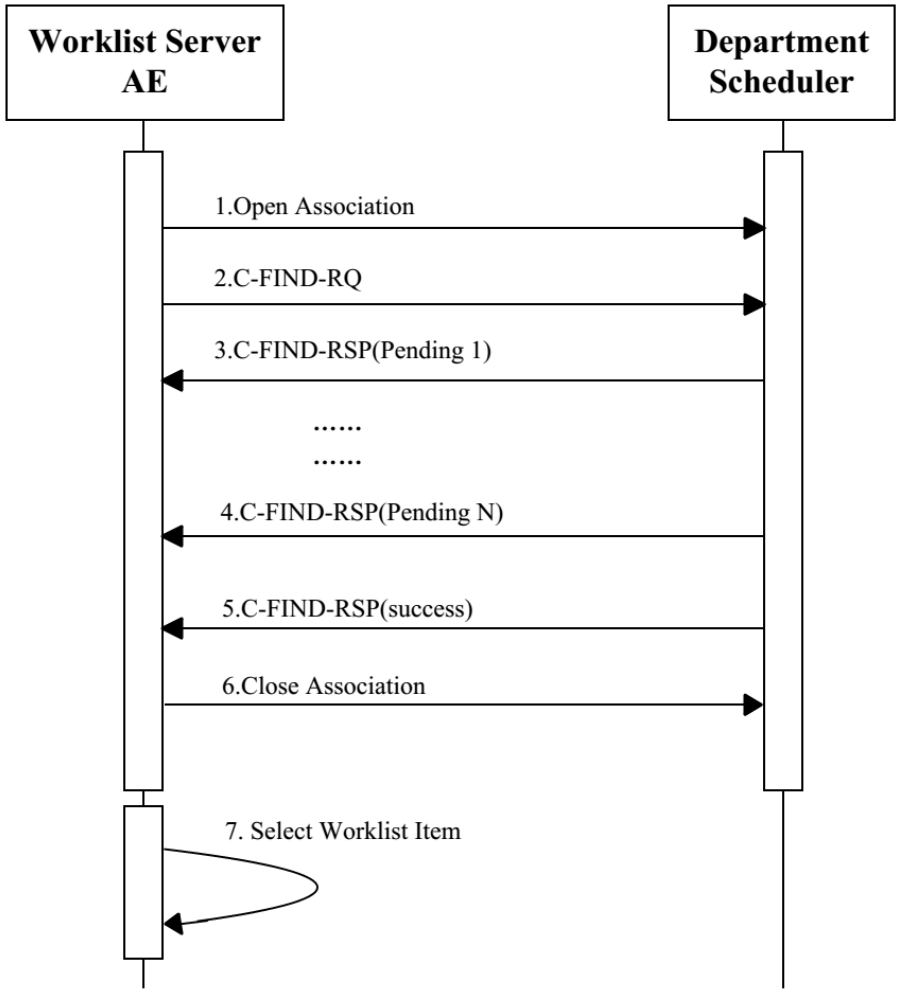
Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDDYYYYMMDD', where YYYYMMDD is set to given From date and YYYYMMDD' is set to given To date.

Patient name:

Patient Name, (0010,0010) - set to given Patient Name.

Patient ID:

Patient ID, (0010,0020) - set to given Patient ID



SEQUENCING OF ACTIVITY-WORKLIST QUERY

A possible sequence of interactions between the Worklist Server AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the Modality Worklist SOP Class as an SCP) is illustrated in the Figure above:

1. The Worklist Server AE opens an association with the Departmental Scheduler

2. Worklist Server AE sends a C-FIND request to the Departmental Scheduler containing the Worklist Query attributes.

3. The Departmental Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist Item.

4. The Departmental Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist Item.

5. The Departmental Scheduler returns another C-FIND response with status Success indicating that no further matching Worklist Items exist. This example assumes that only 2 Worklist items match the Worklist Query.

6. Worklist Server AE closes the association with the Departmental Scheduler.

7. The user selects a Worklist Item from the Worklist and prepares to acquire new images.

2.3.2.2.1.2 Proposed Presentation Context Table

The following table shows the proposed presentationcontexts for the Worklist Server AE after realworld activity "Worklist Query" has been initiated:

Presentation Context Table – Proposed by AE Worklist Server for Activity Worklist Query					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.2.2.1.2.1 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model - FIND SOP Class

The Worklist Server includes matching keys in the Modality Worklist queries as described in Section 5.

If the remote AE does not support the proposed Presentation Context, an appropriate error is logged and the operator is notified.

This implementation can receive multiple C-FIND results over a single association. Only one association is opened at a time.

Each C-FIND response received from the remote AE is parsed to verify the length/type of the items in the response. Upon detecting any error in the response data, the Worklist Server AE will ignore the bad data and carry on to the next C-FIND response.

On receipt of any error from the remote AE, the Worklist Server will issue a CFIND-CANCEL and, upon receipt of a C-FIND-RSP (or if an applicable timer expires), will close the association. Warnings received from the remote AE are ignored.

Each C-FIND operation supports an "Association Timer." This timer starts when the association request is sent or received and stops when the association is established. The default time-out value is 15 seconds.

If the above timer expires, the association is aborted (A-ABORT) and the operation in progress is considered to have failed. Any previously received worklist items are kept.

Following are the status codes that are more specifically processed when receiving messages from a **Modality Worklist** SCP equipment :

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code	Related Fields
Failure	A700	Refused: Out of resources	Association is closed.	(0000,0902)

			Error logged in log file.	
	A900	Error: Identifier does not match SOP Class	Association is closed. Error logged in log file.	(0000,0901) (0000,0902)
	C000-CFFF	Error: Unable to process	Association is closed. Error logged in log file.	(0000,0901) (0000,0902)
	0122	SOP Class Not Supported	Association is closed. Error logged in log file.	(0000,0902)
Cancel	FE00	Matching terminated due to cancel	Association is closed	None
Success	0000	Matching is complete - No final identifier is supplied		None
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.		Identifier
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier		Identifier

2.3.2.3 Association Acceptance Policy

The Worklist Server AE does not respond to attempts by a remote AE to open an association.

2.3.3 PPS SERVER AE Specification

The PPS SERVER Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU:**

SOP Class Name	SOP Class UID	SCU	SCP
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

2.3.3.1 Association Establishment Policies

2.3.3.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the PPS Server is:

Maximum Length PDU	28Kbytes

The SOP class Extended negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 1.

The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID

2.3.3.1.2 Number of Associations

The PPS Server AE will initiate a maximum of 1 simultaneous associations to remote nodes.

2.3.3.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.3.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Brivo XR118 system Implementation UID	1.2.840.113619.6.383
Brivo XR118 system Implementation Version Name	Brivo XR118

2.3.3.2 Association Initiation Policy

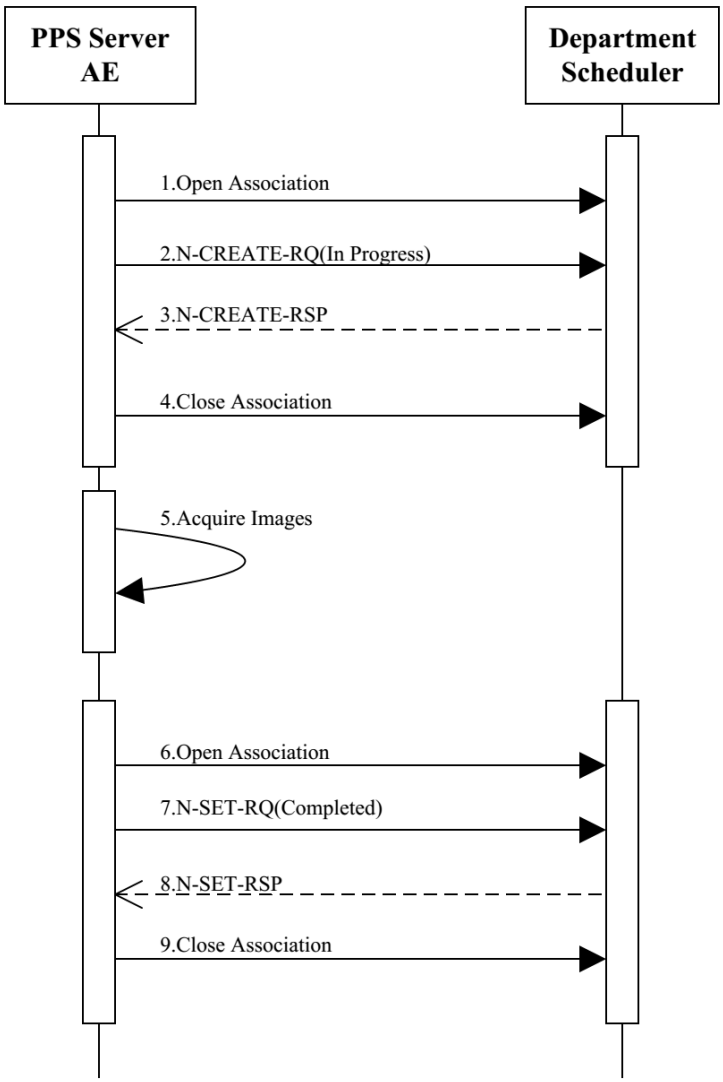
When the PPS Server Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The PPS Server proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.3.2.1 Real-World Activity- Performed Procedure Step creation and update

2.3.3.2.1.1 Associated Real-World Activity

The real-world activities are mentioned in *section 2.2.3 Sequencing of Real-World Activities*. Each of the real world activity results in either creating a new Performed procedure Step SOP instance at the remote SCP or updating an already created Performed Procedure Step SOP instance as per the DICOM v3.0 standard.



SEQUENCING OF ACTIVITY-PPS Create/Update

A possible sequence of interactions between the PPS Server AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the MPPS SOP Class as an SCP) is illustrated in Figure above.

1. PPS Server AE opens an association with the Departmental Scheduler

2. The PPS Server AE sends an N-CREATE request to the Departmental Scheduler to create an MPPS instance with status of “IN PROGRESS” and create all necessary

attributes. The Departmental Scheduler acknowledges the MPPS creation with an N-CREATE response (status success).

3. The PPS Server AE closes the association with the Departmental Scheduler.

4. All images are acquired and stored in the local database.

5. The PPS Server AE opens an association with the Departmental Scheduler.

6. The PPS Server AE sends an N-SET request to the Departmental Scheduler to update the MPPS instance with status of "COMPLETED" and set all necessary attributes. The Departmental Scheduler acknowledges the MPPS update withan N-SET response (status success).

7. The PPS Server AE closes the association with the Departmental Scheduler.

2.3.3.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE PPS Server for Activity PPS creation and update					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.3.2.1.2.1 SOP Specific DICOM Conformance Statement for Modality Performed Procedure Step SOP Class

The PPS Server includes attributes in the Modality Performed Procedure Step N-CREATE as described in Section 6.4

Following are the status codes that are more specifically processed when receiving an N-Create response from an **MPPS** SCP equipment:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	0119	Class-instance conflict	Terminates the association and operation. Logs failure message along with error comment returned from SCP.
	0210	Duplicate invocation	
	0111	Duplicate SOP Instance	
	0106	Invalid attribute value	
	0117	Invalid SOP instance	
	0120	Missing attribute	
	0121	Missing attribute value	

	0212	Mistyped argument	
	0105	No such attributes	
	0118	No such SOP Class	
	0112	No such SOP Instance	
	0110	Processing failure	
	0213	Resource limitation	
	0211	Unrecognized operation	
Success	0000		
*	*	Any other status code.	Deemed a failure

The AE includes attributes in the Modality Performed Procedure Step N-SET as described in Section 6.4.

Following are the status codes that are more specifically processed when receiving an N-Set response from an **MPPS** SCP equipment:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	0119	Class-instance conflict	Logs failure message along with error comment returned from SCP.
	0210	Duplicate invocation	
	0111	Duplicate SOP Instance	
	0106	Invalid attribute value	
	0117	Invalid SOP instance	
	0120	Missing attribute	
	0121	Missing attribute value	
	0212	Mistyped argument	
	0105	No such attributes	
	0118	No such SOP Class	
	0112	No such SOP Instance	
	0110	Processing failure	

	0213	Resource limitation	
	0211	Unrecognized operation	
Success	0000		
*	*	Any other status code.	Deemed a failure

2.3.3.3 Association Acceptance Policy

The PPS Server AE does not respond to attemptsby remote AE to open an association.

2.3.4 STORAGE COMMITMENT SERVER AE Specification

The STORAGE COMMITMENT SERVER Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU**:

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

2.3.4.1 Association Establishment Policies

2.3.4.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the STORAGE COMMITMENT SERVER is:

Maximum Length PDU	28Kbytes

The SOP class Extended negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 1.

The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID

2.3.4.1.2 Number of Associations

The STORAGE COMMITMENT SERVER will initiate a maximum of 1 simultaneous associations to remote nodes.

2.3.4.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.4.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Brivo XR118 system Implementation UID	**1.2.840.113619.6.383**
Brivo XR118 system Implementation Version Name	**Brivo XR118**

2.3.4.2 Association Initiation Policy

When the STORAGE COMMITMENT SERVER Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The STORAGE COMMITMENT SERVER proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.4.2.1 Real-World Activity-Images successfully sent to a remote host declared as a Storage Commitment Provider

2.3.4.2.1.1 Associated Real-World Activity

The user can configure a Remote Host as a Storage Commitment Provider on the Brivo XR118 system.

The operator selects in the BROWSER one or several Patient Folders (or Studies/Series/Images) to be sent. Then, the user can select the icon representing the Remote DICOM AE. The selected Remote DICOM AE must be declared as a Storage Commitment Provider.

This operation will cause:

I. The Brivo XR118 system to retrieve the selected image from its local database.

II. The DICOM SERVER AE to initiate a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.

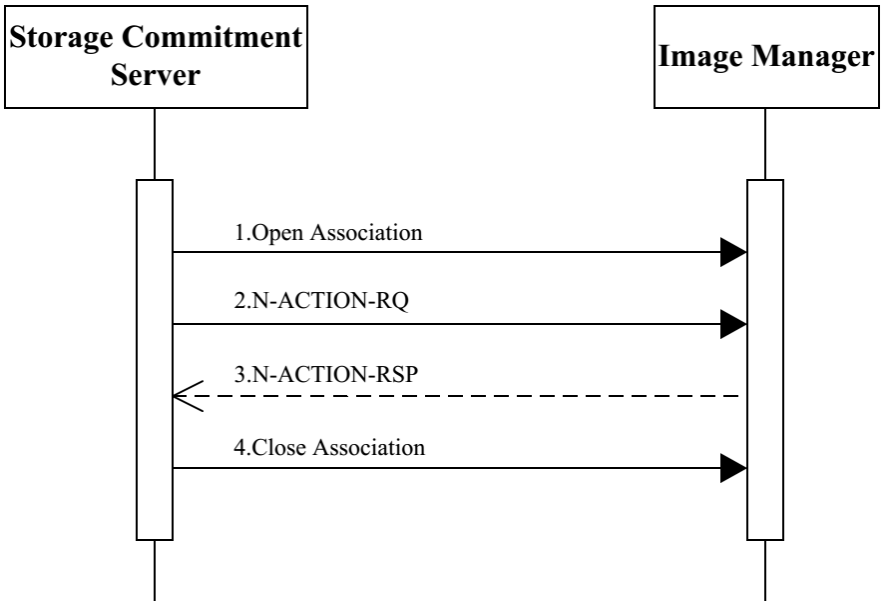
III. To emit C-STORE command to send the image, if the negotiation is successful.

IV. When all images have been successfully sent, the DICOM SERVER AE asks the STORAGE COMMITMENT SERVER AE to commit the images.

V. The STORAGE COMMITMENT SERVER AE initiates a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.

VI. If the negotiation is successful, STORAGE COMMITMENT SERVER AE emits a N-ACTION request. Only one N-ACTION Request issent for all images to be committed.

Note: Storage Commitment is never requested for imagessent to remote host with CR Fallback (see section 2.3.1.2.1.2.2 SOP specific DICOM conformance statement for Digital X-Ray Storage SOP classes).



A possible sequence of interactions between the Storage Commitment-SCU AE and an Image Manager is illustrated in the Figure above:

1. The Storage Commitment-SCU AE opens an association with the Image Manager.

2. A storage commitment request (N-ACTION) is transmitted to the Image Manager to obtain storage commitment of previously transmitted images. The Image Manager replies with an N-ACTION response indicating the request has been received and is being processed.

3. The Storage Commitment-SCU AE closes the association with the Image Manager.

2.3.4.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE STORAGE COMMITMENT SERVER for Activity-Images successfully sent to a remote host declared as a Storage Commitment Provider					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	**SCU**	None

		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.3.4.2.1.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class SCU

The STORAGE COMMITMENT SERVER uses DICOM network storage services to transfer SOP Instances which are to be committed.

The STORAGE COMMITMENT SERVER may request Storage Commitment for Instances of any of the Composite SOP Classes it supports as an SCU (see Section 2.3.1.2.1.2.2).

The Storage Commitment Information Object is described in Section 7.

If the association negotiation is not successful the STORAGE COMMITMENT SERVER AE retries the association negotiation, and if association negotiation still fails, an error file is logged and the Storage Commitment is abandoned.

After the N-ACTION request, if the received N-ACTION Response from the Storage Commitment Provider has a failure status, an error file is logged, the Storage Commitment is abandoned and a pop-up is displayed to the user.

After the N-ACTION request, if the received N-ACTION Response from the Storage Commitment Provider has a success status, the STORAGE COMMIMTMENT SERVER AE can receive the NEVENT-REPORT from the Storage Commitment Provider at any time (see 2.3.4.3.1.1 Real-world activity: Image remotely committed) There is no time out to limit the period of time between the reception of the N-ACTION Response and the reception of the NEVENT-REPORT from the Storage Commitment Provider.

Following are the status codes that are more specifically processed when receiving N-Action responses from a **Storage Commitment** SCP equipment:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Success	0000	Success	The storage commitment result has been successfully received
*	*	Any other status code.	The Association is aborted using A-ABORT and the request for storage comment is marked as failed. The status meaning is logged and reported to the user.

The behavior of Storage AE when receiving Event Typeswithin the N-EVENT-REPORT is summarized in the Table below.

STORAGE COMMITMENT N-EVENT-REPORT BEHAVIOUR

Event Type Name	Event Type ID	Behavior

Storage Commitment Request Successful	1	The Referenced SOP Instancesunder Referenced SOP Sequence (0008,1199) are marked within the database as "Stored & Committed (SC)" to the value of Retrieve AE Title (0008,0054). Successfully committed SOP Instances are candidatesfor automatic deletion from the local database if local resources become scarce. The conditions under which automatic deletion is initiated and the amount of space freed are site configurable. SOP Instances will not be deleted if they are marked with a lock flag. The least recently accessed SOP Instances are deleted first.
Storage Commitment Request Complete – Failures Exist	2	The Referenced SOP Instancesunder Referenced SOP Sequence (0008,1199) are treated in the same way as in the success case (Event Type 1). The Referenced SOP Instances under Failed SOP Sequence (0008,1198) are marked within the database as "Store & Commit Failed (Sf)". The Failure Reasons are logged and the job failure is reported to the user via the job control application. A send job that failed storage commitment will not be automatically restarted but can be restarted by user interaction.

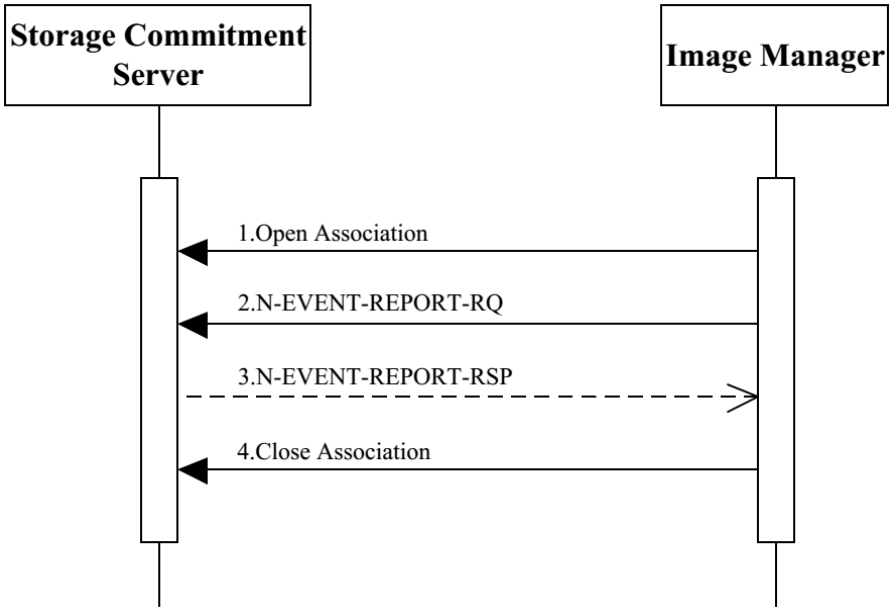
If a Storage Commitment N-EVENT-REPORT is received on the Association initiated by this Application Entity, it will be processed as described for Association initiated by the Storage Commitment SCP (see Section 2.3.4.3.1.2.1).

2.3.4.3 Association Acceptance Policy

2.3.4.3.1 Real-World Activity - *Image remotely committed*

2.3.4.3.1.1 Associated Real-World Activity

The STORAGE COMMITMENT SERVER AE accepts an association for Storage Commitment notification (N-EVENT-REPORT) only as a SCU. The Storage Commitment Provider initiating the association must use the role selection negotiation.



A possible sequence of interactions between the Storage AE and an Image Manager is illustrated in the Figure above:

1. The Image Manager opens a new association with the Storage AE.

2. The Image Manager sends an N-EVENT-REPORT request notifying the Storage AE of the status of a previous Storage Commitment Request. The Storage AE replies with a N-EVENT-REPORT response confirming receipt.

3. The Image Manager closes the association with the Storage AE.

2.3.4.3.1.2 Accepted Presentation Context Table

Presentation Context Table - Accepted by AE STORAGE COMMITMENT SERVER for Activity <local Real-World Activ					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	**SCU**	None

Note: The Storage Commitment Provider initiating the association must use the role selection negotiation.

2.3.4.3.1.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class SCU

The STORAGE COMMITMENT SERVER will only accept the SCU role (which must be proposed via SCP/SCU Role Selection Negotiation) within a Presentation Context for the Storage Commitment Push Model SOP Class.

Upon receiving a Storage Commitment N-EVENT-REPORT (Storage Commitment Result), the STORAGE COMMITMENT SERVER will validate the Transaction UID against its list of outstanding Storage Commitment Request Transaction UIDs. If it matches an outstanding Request, the AE will mark all SOP Instances for which a success status is indicated with an Archived flag, shown on the user interface as “Committed”. When all Instances associated with a Series or a Study are Archived, the Series or Study on the user interface will also be shown on the user interface with status “Committed”. Only Studies, Series, or Instances marked “Committed” may be deleted by user action.

If the Storage Commitment Result indicates any failure status, an error message will be displayed to the user, including the Failure Reason (0008,1197) attribute values, and the error will be written to the error log. Any retry must be manually reinitiated as a new Storage Commitment Request (see Section <section number of Storage Commitment under 2.3.4.2). The list of specific Failure Reason Codes that this AE will be able to process is described in Section.

Following are the status codes the Application may send back in the **N-Event-Report** response command to the **Storage Commitment** SCP Equipment that sent the N-Event-Report request:

Service Status	Status Code	Further Meaning	Status Code Explanation
Failure	0115	Invalid argument value	One or more SOP Instance UIDs with the Referenced SOP Sequence (0008,1199) or Failed SOP Sequence (0008,1198) was not included in the Storage Commitment Request associated with this Transaction UID. The unrecognized SOP Instance UIDs will be returned within the Event Information of the N-EVENT-REPORT response.
	0114	No such argument	Confirmation status of the operation-This optional field shall optionally contain the SOP Class UID for which the argument does not exist.
	0113	No such event type	An invalid Event Type ID was supplied in the N-EVENT-REPORT request.
	0110	Processing failure	An internal error occurred during processing of the N-EVENTREPORT. A short description of the error will be returned in Error Comment (0000,0902).
	0213	Resource limitation	The Transaction UID in the N-EVENT-REPORT request has expired
	0211	Unrecognized operation	The Transaction UID in the N-EVENT-REPORT request is not recognized (was never issued within an N-ACTION request).
Success	0000		The storage commitment result has been successfully received.
*	*	Any other status code.	The storage commitment result has some error, so result has not been successfully received.

2.3.4.3.1.3 Presentation Context Acceptance Criterion

The STORAGE COMMITMENT SERVER evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.4.3.1.4 Transfer Syntax Selection Policies

Within each Presentation Context, the STORAGE COMMITMENT SERVER will accept the first proposed transfer syntax that it also supports for that Abstract Syntax.

Within each Presentation Context, the STORAGE COMMITMENT SERVER will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Explicit VR Big Endian
3. Implicit VR Little Endian

2.3.5 DICOM PRINT SCU AE Specification

The DICOM PRINT SCU Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU**:

SOP Class Name	SOP Class UID	SCU	SCP
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No

2.3.5.1 Association Establishment Policies

2.3.5.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the DICOM PRINT SCU is:

Maximum Length PDU	16384

The Print Management Service Class does not support Extended negotiation.

The maximum number ofPresentation Context Items that will be proposed is: 6

The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID
- Implementation Version Name

2.3.5.1.2 Number of Associations

The DICOM PRINT SCU will initiate a maximum of 2 simultaneous associations to remote nodes.

2.3.5.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.5.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Brivo XR118 system Implementation UID	1.2.840.113619.6.383
Brivo XR118 system Implementation Version Name	Brivo XR118

2.3.5.2 Association Initiation Policy

When the DICOM PRINT SCU Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The DICOM PRINT SCU proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.5.2.1 Real-World Activity -*Manual image print*

2.3.5.2.1.1 Associated Real-World Activity

The operator does the following:

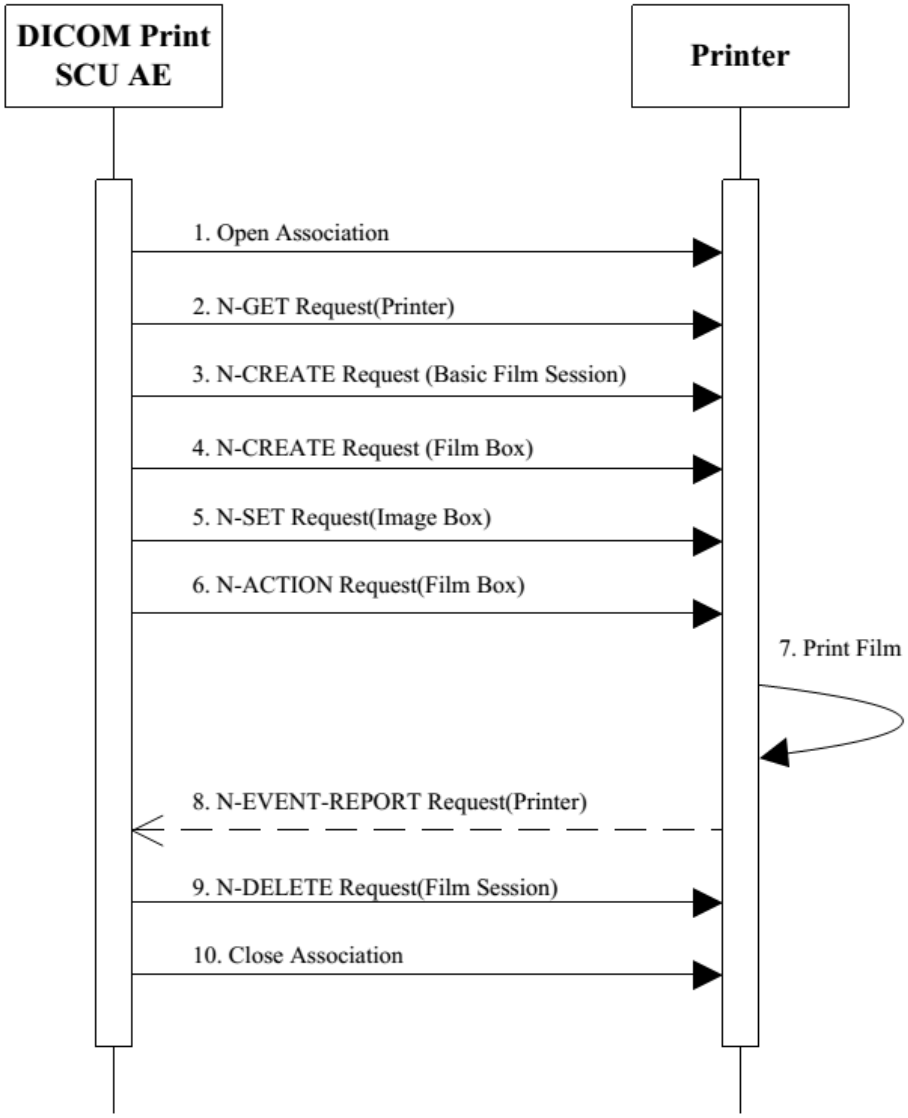
I. Select an image in Viewer.

II. Select Print. Print window is displayed.

III. Check or modify selected printer and print parameters (film format, number of copies, pixel depth, etc.).

IV. Select Print to confirm.

This operation will cause the DICOM PRINT SCU AEto try to establish the association with the requested printer and sends the images for printing.



A typical sequence of DIMSE messages sent over an association between DICOM Print SCU AE and a Printer is illustrated in Figure above

1. initiates a DICOM association and negotiates Presentation Contexts

2. N-GETs printer status using the Printer SOP Class

3. N-CREATEs a Basic Film Session SOP Instance

4. N-CREATEs a Basic Film Box SOP Instance for each film

5. N-SETs the Image Box SOP Instance for each image on the film

6. N-ACTION on the Film Box SOP Class instructs the printer to print the Film Box.

7. Receives N-EVENT-REPORTs of the well known Printer SOP Instance indicating printer status

8. If no N-EVENT-REPORT has been received after a configurable timeout, performs an N-GET to obtain the printer status from the well known Printer SOP Instance

9. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.

Releases the DICOM association after printing is successful or failure has been signalled to the user

2.3.5.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM PRINT SCU for Activity Manual image print					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.5.2.1.2.1 Common SOP Specific Conformance for all Print SOP Classes

The general behavior of the Print SCU AE during communication failure is summarized in the table below.

PRINT COMMUNICATION FAILURE BEHAVIOR

Exception	**Behavior**
Timeout	The Association is aborted using A-ABORT and the print-job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.
Association aborted by the SCP or network layers	The print-job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.

2.3.5.2.1.2.2 SOP Specific DICOM Conformance Statement for Basic Grayscale Print Management SOP Classes

The DICOM PRINT SCU uses the following DIMSE services of the supported SOP Classes:

SOP Class	SOP Class UID	DIMSE Service Element	SCU Usage
Basic Film Session	1.2.840.10008.5.1.1.1	N-CREATE	Used (Mandatory)
		N-SET	Not Used
		N-DELETE	Used
		N-ACTION	Not Used

Basic Film Box	1.2.840.10008.5.1.1.2	N-CREATE	Used (Mandatory)
		N-ACTION	Used (Mandatory)
		N-DELETE	Not Used
		N-SET	Not Used
Printer	1.2.840.10008.5.1.1.16	N-EVENT-REPORT	Used (Mandatory)
		N-GET	Used
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	N-SET	Used (Mandatory)

The PRINT SCU AE includes data elements in the SOP Instances with associated value sets as described in Section 8.

2.3.5.2.1.2.2.1 Basic Film Session SOP Clas

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Session SOP Class N-CREATE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Warning	B600	Memory allocation not supported	Association is aborted
Success	0000	Film session successfully created	Next step described in the sequencing of realworld activities paragraph is performed
*	*	Any other status code.	The Association is aborted and the print-job is marked as failed. The status meaning is logged and reported to the user.

2.3.5.2.1.2.2.2 Basic Film Box SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Box SOP Class N-CREATE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Warning	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	The N-CREATE operation is considered successful but the status meaning is logged.
Success	0000	Film box successfully created	The SCP has completed the operation successfully.
*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status

			meaning is logged and reported to the user.

The N-ACTION DIMSE service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to print the Basic Film Box onto the hard copy printer.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Box SOP Class N-ACTION:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	C602	Unable to create Print Job SOP Instance; print queue is full	Appropriate message is returned to the user. Association is aborted.
	C603	Image size is larger than image box size (by using the specified magnification value)	Appropriate message is returned to the user. Association is aborted.
	C604	Image position collision : multiple images assigned to single image position	Appropriate message is returned to the user. Association is aborted.
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	This case should not happen. This warning is considered as an error. Association is aborted.
Success	0000	Film accepted for printing; if supported, the Print Job SOP Instance is created	Next step describe in the sequencing of Real-World Activities paragraph is performed

The N-DELETE DIMSE service element sent by the DICOM Print SCU AE requests the

Remote DICOM Print SCP to release the Basic Film Box instance.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Box SOP Class N-DELETE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Success	0000	Film box successfully deleted	The SCP has completed the operation successfully
*	*	Any other status code.	Deem a failure

2.3.5.2.1.2.2.3 Basic Grayscale Image Box SOP Classes

Behavior:

There is no specific behavior.

The SCU does not instruct the SCP to erase the image in the image position by setting a zero length and no value in the Attribute Preformatted Grayscale Image Sequence (2020,0110) or Preformatted Grayscale Image Sequence (2020,0111).

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Grayscale Image Box SOP Classes N-SET:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	C603	Image size is larger than image box size	The Association is aborted using AABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	C605	Insufficient memory in printer to store the image	
	C613	Combined Print Image size is larger than the Image Box size	
Warning	B604	Image size larger than image box size, the image has been demagnified.	The N-SET operation is considered successful. but the status meaning is logged.
	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	The N-SET operation is considered successful but the status meaning is logged
	B609	Image size is larger than the Image Box size. The Image has been cropped to fit.	The Association is aborted and the print-job is marked as failed. The status meaning is logged and reported to the user.
	B60A	Image size or Combined Print Image size is larger than the Image Box size. The Image or Combined Print Image has been decimated to fit.	The Association is aborted and the print-job is marked as failed. The status meaning is logged and reported to the user.
Success	0000	Image successfully stored in Image Box	The SCP has completed the operation successfully. Image successfully stored in Image Box
*	*	Any other status code.	Deem a failure

2.3.5.2.1.2.2.4 Printer SOP Class

The PRINT SCU AE supports the Printer SOP Class to receive information on the status of the printer.

For the product behavior description when receiving N-Event-Report request, refer to section 8.8.1.

PRINTER SOP CLASS N-EVENT-REPORT BEHAVIOR

Event Type Name	Event Type ID	Behavior
Normal	1	The print-job continues to be printed.
Warning	2	The print-job continues to be printed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job-control application.
Faliure	3	The print-job is marked as failed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job-control application.

Note: The N-EVENT-REPORT default timeout is set to 30 seconds.

Also, following are the status codes the Application may send back in the **N-Event-Report** response command to the **Printer SOP Class** SCP Equipment that sent the N-Event-Report request:

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
Success	0000	Success	The notification eventhas been successfully received.	None
*	Any other status code	*	An error occurred during processing of the N-EVENT-REPORT. A short description of the error will be returned in Error Comment (0000,0902).	

For the attribute list requested by this product and for the behavior of this product on each returned value, refer to Section 8.8.2.

The Printer Status information is evaluated as follows:

I. If Printer status (2110,0010) is NORMAL, the print-job continues to be printed.

II. If Printer status (2110,0010) is FAILURE, the print-job is marked as failed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job control application.

III. If Printer status (2110,0010) is WARNING, the print-job continues to be printed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job control application.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Printer SOP Class N-GET:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Success	0000	Success	The request to get printer status information was success.

*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

2.3.5.2.2 Real-World Activity-Automatic image print

2.3.5.2.2.1 Associated Real-World Activity

Same as Manual Print except step 1 and 2 to be replaced by:

I. User sets Auto-Print ON, defines auto-printparameters, and configures the Quality Check default to “OK to print” or “Not OK to print” from Medical Applications Preferences.

II. User starts an exam and acquires images.

III. User sets the Quality Check flag to “OK to print” or “Not OK to print”.

IV. User selects CLOSE EXAM.

V. All images with the Quality Check flag set to “OK to print” are automatically printed

2.3.5.2.2.2 Proposed Presentation Context Table

Same as Manual Print.

2.3.5.2.2.2.1 Common SOP Specific Conformance for all Print SOP Classes

Same as Manual Print.

2.3.5.2.2.2.2 SOP Specific DICOM Conformance Statement for Basic Grayscale and Color Print Management and Printer Queue Management SOP Classes

Same as Manual Print.

2.3.5.2.2.2.2.1 Basic Film Session SOP Class

Same as Manual Print

2.3.5.2.2.2.2.2 Basic Film Box SOP Class

Same as Manual Print

2.3.5.2.2.2.2.3 Basic Grayscale Image Box SOP Class

Same as Manual Print.

2.3.5.2.2.2.2.4 Printer SOP Class

Same as Manual Print.

2.4 COMMUNICATION PROFILES

2.4.1 Supported Communication Stacks

The DICOM Upper Layer Protocol is supported using TCP/IP, as specified in DICOM PS3.8.

2.4.2 Physical Media Support

The product is provided with a 10/100 Mb/s auto-sensing Ethernet interface. Additional or alternate network interfaces may be available.

2.5 EXTENSIONS / SPECIALIZATIONS/ PRIVATIZATIONS

2.5.1 Standard Extended / Specialized / Private SOP Classes

2.5.1.1 Standard Extended SOP Classes

None supported.

2.5.1.2 Private SOP Class

None supported

2.5.2 Private Transfer Syntaxes

None supported.

2.6 CONFIGURATION

2.6.1 AE Title/Presentation Address Mapping

2.6.2 Configurable Parameters

The following fields are configurable:

• Local IP Address

• Local IP Netmask

• Default Router IP Address for local network. Only one default routerIP Address can be configured for all remote nodes.

The Local Listening Port Number for C-STORE SCP DICOM service is not configurable and set to 4010.

The Local Listening Port Number for STORAGE COMMITMENT DICOM service is not configurable and set to 4010.

The following fields are configurable for every remote DICOM AE including Worklist provider:

• Remote AE Title

• Remote IP Address

• Listening TCP/IP Port Number

2.7 SUPPORT OF EXTENDED CHARACTER SETS

The system will support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. supplementary set) as extended character sets.

2.8 SECURITY PROFILES

he product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured

environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access

to the product.

2. Firewall or router protections toensure that the product only has network access to approved

external hosts and services.

3. Any communications with external hosts and services outside the locally secured environment

use appropriate secure network channels (such as a Virtual Private Network (VPN)) The

The system will support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet

N 1. supplementary set) as extended character sets.

3. MEDIA STORAGE CONFORMANCE STATEMENT

3.1 INTRODUCTION

This section of the DICOM conformance statement specifies the Brivo XR118 system compliance to DICOM Media Interchange. It detailsthe DICOM Media Storage Application Profiles and roles that are supported by this product.

This station provides capabilities to DICOM interchange on USB Connected Removable Devices. The Brivo XR118 system works with Digital X-Ray (DX) For Processing, and Digital X-Ray (DX) For Presentation images.

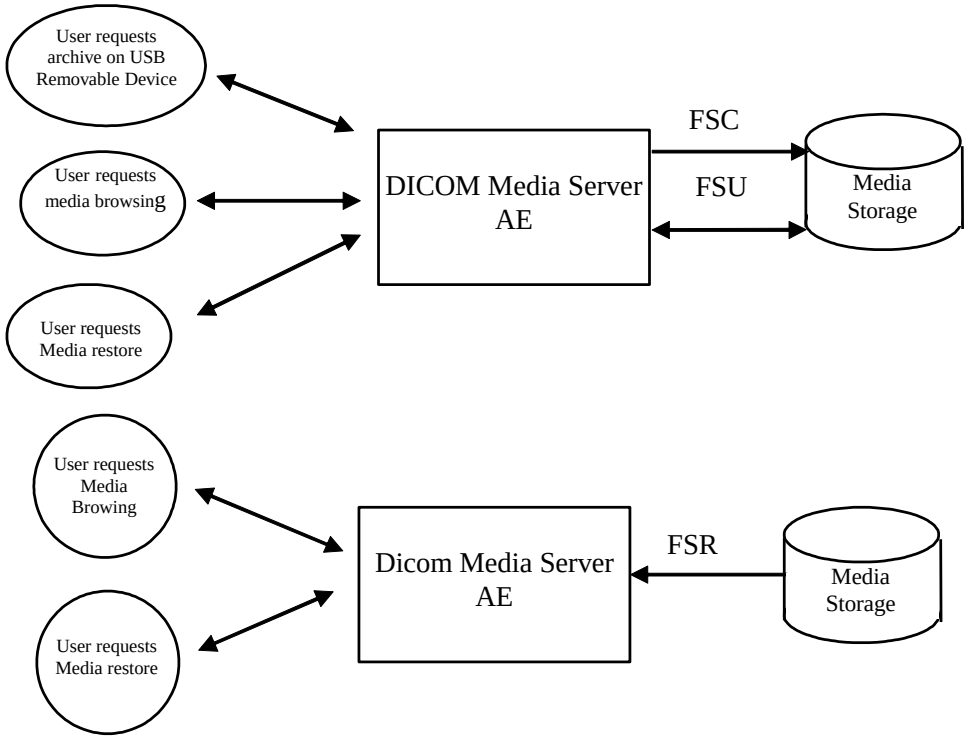
Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Refer to that part of the standard while reading this section.

3.2 IMPLEMENTATION MODEL

3.2.1 Application Data Flow Diagram

The media intechange application model for the The Brivo XR118 system is shown in the following Illustration :

ILLUSTRATION 3–1
THE BRIVO XR118 SYSTEM MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM



3.2.2 Functional Definition of AE's

The DICOM Media Server Application Entity supports the following functions:

• Has access to patient demographics and pixel data in the local database.

• Can generate a DICOM File Set (FSC) for Digital X-Ray (DX) For Processing and DX For Presentation data types ina one shot activity.

• Can write a DICOM File Set (FSC) on USB Connected Removable Devices

• Can read a DICOM File Set (FSR) on USB Connected Removable Devices

3.2.3 Sequencing of Real-World Activities

Non-applicable for writing a CDR or DVDR.

For restoring images from a CDR or DVDR:

1. Browse CDR or DVDR Media

2. Select images to be restored from CDR or DVDR Media to the system.

3. System restores images.

3.2.4 File Meta Information Options (See PS3.10)

The File Meta-Information for this implementation is :

Brivo XR118 system Implementation UID	**1.2.840.113619.6.383**
Brivo XR118 system Implementation Version Name	**Brivo XR118**

3.3 AE SPECIFICATIONS

3.3.1 DICOM Media Server AE Specification

The DICOM Media Server Application Entity provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The supported Application Profiles and roles are listed below.

Supported Application Profile	Real World Activity	Role	Option
STD-GEN-DVD-JPEG	Browse USB Media	FSR	Interchange
	Restore USB Media	FSR	Interchange
	Archive USB Media	FSC	Interchange

3.3.1.1 File Meta Information for the DICOM Media Server Application Entity

Following are the values set in the File Meta Information for this AE Title :

<Remove the last row, if Implementation Version Name not supported>

Source Application Entity Title	**Set to system hostname**

3.3.1.2 Real-World Activities for the DICOM Media Server Application Entity

3.3.1.2.1 Real-World Activity

Real-World Activity (RWA) “Browse USB Media”

The DICOM Media DICOM Media Server AE acts as an FSR using the interchange option when requested to browse the USB Media.

When the DICOM Media Server AE is requested to provide a directory listing,

it reads the File-set and displays the DICOMDIR directory entries, according to the PATIENT, STUDY, SERIES, IMAGE paradigm.

a Media Storage Application Profile for the RWA “Browse USB Media”:
For the list of Application Profiles that invoke this AE for the Browse USB Media RWA, see the Tablein Section 3.3.1

> Options:

Following are the SOP Classes supported by the RWA “Browse USB Media”:

Information Object Definition	SOP Class UID	Transfer	Transfer Syntax
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little	1.2.840.10008.1.2.1

b Real-World Activity (RWA) ”Restore from USB Media”

The DICOM Media Server AE acts as an FSR using the interchange option when requested to copy SOP instances from the USB Media to the local database.

The user selects the SOP instances that he wants the DICOM Media Server AE to copy on the local database by a drag and drop on the local browser icon or by clicking on the suitable restore buttons. Once selected, the SOP instances are copied from the media to the local database.

Only, the SOP classes supported by the station are declared to the database in a transfer syntax supported by the station.

> Media Storage Application Profile for RWA “Restore USB Media”:

For the list of Application Profiles that invoke this AE for the Restore CD/DVD RWA, see the Table in Section 3.3.1.

> Options:

Following are the SOP Classes supported by the RWA “Restore CD/DVD”:

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital X-ray For Processing Image Storage	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital X-ray For Presentation Image Storage	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1

Note: Secondary Captures display is not supported.

Note: Other objects such as Digital Mammography X-ray Images can be restored but there are some limitations on the system working with such objects.

c Real-World Activity (RWA) “Archive USB Media”

The DICOM Media Server acts as an FSC using the interchange option when requested to copy SOP Instances from the local database to the USB Media.

The user has to insert a blank USB Media to the USB outlet. Then, the user selects the entries in the local database that he wants the DICOM Media Server to copy onto the USB Media.

A confirmation pop-up that indicates what can be archived on the USB Media is displayed.

Before writing the USB Media , the DICOM Media Server checks for the following conditions:

- The media is blank and writable. If the condition is not met, an error is displayed.
- The corresponding SOP instances have been encoded with the ISO_IR 100 Specific Character Set or DICOM Default Character Set.

The corresponding SOP instances are set to the transfer syntax defined by the application and copied to the USB Media. Unknown Private Data Elements are coded as "UN" for Unknown.

> Media Storage Application Profile for RWA "Archive

USB Media": This AE can use the STD-GEN-DVD-JPEG profile.

Please refer to the Table in Section 3.3.1.

> Options:

Following are the SOP Classes supported by the RWA "Archive USB Media":

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little	1.2.840.10008.1.2.1
Digital X-ray For Processing Image	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little	1.2.840.10008.1.2.1
Digital X-ray For Presentation Image	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little	1.2.840.10008.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little	1.2.840.10008.1.2.1

3.4 AUGMENTED AND PRIVATE APPLICATION PROFILES

No augmented/private profile is implemented

3.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

3.5.1 Standard Extended / Specialized / Private SOP Classes

3.5.1.1 Standard Extended SOP Classes

The following keys are added as Type 3 data elements in the Basic Directory IOD:

Key Attribute	Tag	Directory Record Type
Image Type	(0008,0008)	IMAGE
Institution Name	(0008,0080)	SERIES
Institution Address	(0008,0081)	SERIES
Attending Physician's Name	(0008,1050)	SERIES
Series Description	(0008,103E)	SERIES
Manufacturer	(0008,1090)	SERIES
Patient's Birth Date	(0010,0030)	PATIENT
Patient's Sex	(0010,0040)	PATIENT
Body Part Examined	(0018,0015)	IMAGE
Acquisition Device Processing Description	(0018,1400)	IMAGE
Image Laterality	(0020,0062)	IMAGE
Rows	(0028,0010)	IMAGE
Columns	(0028,0011)	IMAGE

3.5.2 Private Transfer Syntaxes

3.5.2.1 Private Transfer Syntax

No private Transfer Syntax is written on media by the described DICOM SERVER AE of BRIVO XR118 Acquisition Workstation.

3.6 CONFIGURATION

The source AE Title encoded in the File Meta-Information cannot be modified.

3.7 SUPPORT OF EXTENDED CHARACTER SETS

The BRIVO XR118 Acquisition Workstation will support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. supplementary set) as extended character sets. Any incoming SOP instance that is encoded using another extended character set will not be installed in the local database.

4. DIGITAL X-RAY INFORMATION OBJECT IMPLEMENTATION

4.1 INTRODUCTION

This section specifies the use of the DICOM Digital X-ray (DX) Image IOD to represent the information included in DX images produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

4.2 - IOD Description

4.3 - IOD Entity-Relationship Model

4.4 - IOD Module Table

4.5- IOD Module Definition.

4.2 DX IOD IMPLEMENTATION

The DX Image IOD is used in two SOP classes as defined in PS3.4 Storage Service Class, a SOP Class for storage of images intended for presentation, and a SOP class for storage of images intended for further processing before presentation. These are distinguished by their SOP Class

UID and by the Enumerated Value of the mandatory Attribute in DX Series Module, Presentation

Intent Type (0008,0068).

4.3 DX ENTITY-RELATIONSHIP MODEL

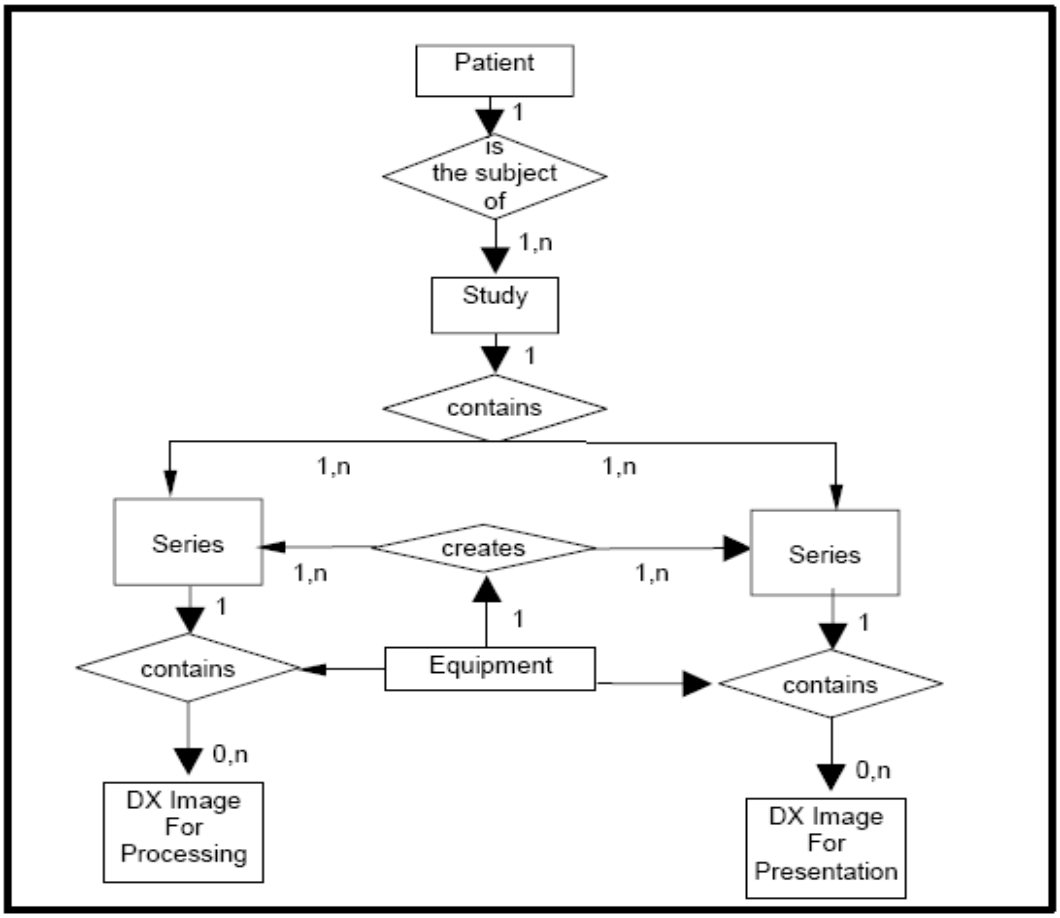
The Entity-Relationship diagram for the DX Image interoperability schema is shown in Illustration SECTION 4-1. In this figure, the following diagrammatic convention is established to represent the information organization:

- each entity is represented by a rectangular box
- each relationship is represented by a diamond shaped box.
- the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series, but the Patient to Study relationship has 1 Study for each Patient (a Patient can have more than one Study on the system, however each Study will contain all of the information pertaining to that Patient).

ILLUSTRATION SECTION 4-1

DX IMAGE ENTITY RELATIONSHIP DIAGRAM



4.3.1 Entity Descriptions

Please refer to DICOM Standard Part 3 (Information Object Definitions) and Supplement 32 for a description of each of the entities contained within the DX Information Object.

4.3.2 BRIVO XR118 Acquisition Workstation Mapping of DICOM entities

DICOM	BRIVO XR118 Acquisition Workstation Entity
Patient	Patient
Study	Study
Series	Series
Image	Image
Frame	Not Applicable

Table 3-1 MAPPING OF DICOM ENTITIES TO Brivo XR118 ACQUISITION WORKSTATION ENTITIES

4.4 IOD MODULE TABLE

Within an entity of the DICOM DX IOD, attributes are grouped into related sets of attributes. A set

of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.

Table 2-2 identifies the defined modules within the entities that comprise the DICOM DX IOD. Modules are identified by Module Name.

See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

IE	Module	DICOM Reference	Usage
Patient	Patient	C.7.1.1	M
Study	General Study	C.7.2.1	M
Series	General Series	C.7.3.1	M
	DX Series	C.8.11.1	M
Equipment	General Equipment	C.7.5.1	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	DX Anatomy Imaged	C.8.11.2	M
	DX Image	C.8.11.3	M
	DX Detector	C.8.11.4	M
	DX Positioning	C.8.11.5	U
	X-Ray Acquisition Dose	C.8.7.8	U
	Overlay Plane	C.9.2	C
	VOI LUT	C.11.2	C
	Acquisition Context	C.7.6.14	M
	SOP Common	C.12.1	M
Private Moidule	Application Module		

Table 3-2 DX IMAGE IOD MODULES

4.5 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Infomation Object Definitions) for a description of each of the entities and modules contained within the DX Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for

completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions).

4.5.1 Common Patient Entity Modules

4.5.1.1 Patient Module

This section specifies the Attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient

Attribute Name	Tag	Type	Attribute Description
Referenced Patient Sequence	(0008,1120)	3	This information is present only if retrieved from HISRIS
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	
Patient's Name	(0010,0010)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Patient ID	(0010,0020)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Patient's Birth Date	(0010,0030)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Patient's Sex	(0010,0040)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.

Table 3-3 PATIENT MODULE ATTRIBUTES

4.5.2 Common Study Entity Modules

The following Study IE Modules are common to all Composite Image IODs that reference the Study IE. These Modules contain Attributes of the patient and study that are needed for diagnostic interpretation of the image.

4.5.2.1 General Study Module

This section specifies the Attributes that describe and identify the Study performed upon the Patient

Attribute Name	Tag	Type	Attribute Description
Study Date	(0008,0020)	2	The system set to today's date when generating a new study.
Study Time	(0008,0030)	2	The system set to current time when generating a new study.

Accession Number	(0008,0050)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Referring Physician's Name	(0008,0090)	2	The value is loaded from HIS/RIS .
Study Description	(0008,1030)	3	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Referenced Study Sequence	(0008,1110)	3	This information is present only if retrieved from
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance	(0008,1155)	1C	
Study Instance UID	(0020,000D)	1	The value is loaded from HIS/RIS or is generated by the system.
Study ID	(0020,0010)	2	The value is loaded from HIS/RIS or is generated by the system.

Table 3-4 GENERAL STUDY MODULE ATTRIBUTES

4.5.3 Common Series Entity Modules

The following Series IE Modules are common to all Composite Image IODs that reference theSeries IE.

4.5.3.1 General Series Module

Series Date	(0008,0021)	3	DT	1	Date the Series started.
Series Time	(0008,0031)	3	TM	1	Time the Series started.
Modality	(0008, 0060)	1	CS	1	Type of equipment that originally acquired the data used to create the images in this Series. Enumerated Values: DX PX IO MG See section C.7.3.1.1.1 for further explanation.
Performing Physicians' Name	(0008,1050)	3	PN	1-n	Name of the physician(s) administering the Series.
Protocol Name	(0018,1030)	3	LO	1	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).
Operators' Name	(0008,1070)	3	PN	1-n	Name(s) of the operator(s) supporting the Series.

Body Part Examined	(0018,0015)	3	CS	1	Text description of the part of the body examined. See PS 3.16 Annexes on Correspondence of Anatomic Region Codes and Body Part Examined for Humans and for Animals for Defined Terms Note: Some IODs support the Anatomic Region Sequence (0008,2218), which can provide a more
Series Instance UI	(0020, 000E)	1	UI	1	Unique identifier of the Series.Note: No SR-specific semantics are specified.
Series Number	(0020, 0011)	2	IS	1	A number that identifies the Series.Note: No SR-specific semantics are specified
Series Description	(0008. 103E)	3	LO	1	Shall have a value in the appropriate language for local use that means the equivalent of “Radiation Dose Information”, or similar.
Referenced Performed Procedure Step Sequence	(0008. 1111)	3	SQ	1	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP Instance). The Sequence shall have zero or one Item.
Referenced SOP Class UID	(0008,1150)	1	UI	1	Uniquely identifies the referenced SOP Class.
Referenced SOP Instance UID	(0008,1155)	1	UI	1	Uniquely identifies the referenced SOP Instance.
Request Attributes Sequence	(0040,0275)	3	SQ	1	
>Requested Procedure ID	(0040,1001)	1C	UI	1	
>Scheduled Procedure Step Description	(0040,0007)	3	LO	1	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
>Scheduled Protocol Code Sequence	(0040,0008)	3	SQ	1	Sequence describing the Scheduled Protocol following a specific coding scheme. One or more Items are permitted in this sequence.
>Scheduled Procedure Step ID	(0040,0009)	1C	SH	1	Identifier that identifies the Scheduled Procedure Step. Required if procedure was scheduled. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the

					procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure step was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.

Table 3-5 GENERAL SERIES MODULE ATTRIBUTES

4.5.3.2 DX Series Module

This Module contains IOD Attributes that describe a Digital X-ray series performed on the patient

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Defined Terms: DX = Digital X-ray
Presentation Intent Type	(0008,0068)	1	Enumerated Values: FOR PRESENTATION FOR PROCESSING

Table 3-6 DX SERIES MODULE ATTRIBUTES

4.5.4 Common Equipment Entity Modules

The following Equipment IE Module is common to all Composite Image IODs that reference the Equipment IE.

4.5.4.1 General Equipment Module

This section specifies the Attributes that identify and describe the piece of equipment that produced a Series of Images.

Attribute Name	Tag	Typ	Attribute Description
Manufacturer	(0008,0070)	2	Value set to “GE Healthcare”
Institution Name	(0008,0080)	3	Value comes from configuration file
Institution Address	(0008,0081)	3	Value comes from configuration file
Station Name	(0008,1010)	3	Value comes from configuration file
Institutional Department	(0008,1040)	3	Value comes from configuration file
Manufacturer's Model Name	(0008,1090)	3	Value set to “Brivo XR118.”
Software Versions	(0018,1020)	3	Value set to Software version xx.yy, where xx.yy is the release of the SW that generated the image.

Table 3-7 GENERAL EQUIPMENT MODULE ATTRIBUTES

4.5.5 Common Image Entity Modules

The following Image IE Modules are common to all Composite Image IODs that reference the Image IE

4.5.5.1 General Image Module

This section specifies the Attributes that identify and describe an image within a particular series.

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	3	Value 1 Enumerated Values are: ORIGINAL identifies an Original Image DERIVED identifies a Derived Image Value 2 Enumerated Values are: PRIMARY identifies a Primary Image SECONDARY identifies a Secondary Image Value 3 is left EMPTY.
Acquisition Date	(0008,0022)	3	
Content Date	(0008,0023)	2C	Set by the system when building the image. Equal to Acquisition Date in DX For Processing image.
Content Time	(0008,0033)	2C	Set by the system when building the image. Equal to Acquisition Time in DX For Processing image.
Acquisition Time	(0008,0032)	3	
Source Image Sequence	(0008,2112)	3	Only sent in DX for Presentation Images. Tomosynthesis slices will have references of all projection images used for the derivation.
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	

Derivation Description	(0008,2111)	3	Only present in Dual Energy DX For Presentation Images. This field will be set to "DE Subtraction Soft Tissue" for Soft Tissue image and "DE Subtraction Bone" for Bone image. Also present in "For Presentation" images generated by Image Pasting. The values could be "Auto Pasted Image" or
Instance Number	(0020,0013)	2	Number generated by the system
Patient Orientation	(0020,0020)	2C	Set according to the clinical view. Example: For chest PA, it is set to R/F Note: this tag is configurable in SUIF
Quality Control Image	(0028,0300)	3	
Burned In Annotation	(0028,0301)	3	Always set to NO
Lossy Image	(0028,2110)	3	Always set to 00

Table 3-8 GENERAL IMAGE MODULE ATTRIBUTES

4.5.5.2 Image Pixel Module

This section specifies the Attributes that describe the pixel data of the image.

Attribute Name	Tag	Typ	Attribute Description
Samples per Pixel	(0028,0002)	1	Always set to 1
Photometric Interpretation	(0028,0004)	1	Set to MONOCHROME1 in DX For Processing images. Set to MONOCHROME2 in DX For Presentation images.
Rows	(0028,0010)	1	<= 2022 For Processing images.
Columns	(0028,0011)	1	<= 2022 For Processing images.
Bits Allocated	(0028,0100)	1	Set to 16
Bits Stored	(0028,0101)	1	Set to 14
High Bit	(0028,0102)	1	Set to 13
Pixel Representation	(0028,0103)	1	Always set to 0000H (unsigned integer)
Pixel Data	(7FE0,0010)	1	

Table 3-9 IMAGE PIXEL MODULE ATTRIBUTES

4.5.6 DX Anatomy Imaged Module

The table in this Section contains IOD Attributes that describe the anatomy contained in a DX IOD.

Attribute Name	Tag	Type	Attribute Description
Image Laterality	(0020,0062)	1	Enumerated Values: R = right L = left U = unpaired B = both left and right
Anatomic Region Sequence	(0008,2218)	2	
>Code Value	(0008,0100)	1C	Set to code corresponding to anatomic region. Example: T-D3000 for Chest
>Coding Scheme Designator	(0008,0102)	1C	Always set to "SNM3"
>Code Meaning	(0008,0104)	1C	Set to code meaning corresponding to anatomic region sequence Code Value. Example: Set to Chest if code = T-D3000

Table 3-10 DX ANATOMY IMAGED MODULE ATTRIBUTES

4.5.6.1 DX Image Module

The table in this Section contains IOD Attributes that describe a DX image by specializing Attributes of the General Image and Image Pixel Modules, and adding additional attributes.

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Image identification characteristics. See C.8.11.3.1.1 for specialization.
Samples Per Pixel	(0028,0002)	1	Number of samples (planes) in this image. See C.7.6.3.1.1 for further explanation.
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data. See C.7.6.3.1.2 for further explanation.
Bits Allocated	(0028,0010)	1	Number of bits allocated for each pixel sample. Enumerated Values: 8, 16
Bits Stored	(0028,0011)	1	Number of bits stored for each pixel sample. Enumerated Values: 6 to 16
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Each sample shall have the same high bit. See PS 3.5 for further explanation.

Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values: 0000H = unsigned integer. 0001H = 2's complement
Pixel Intensity Relationship	(0028,1040)	1	The relationship between the Pixel sample values and the X-Ray beam intensity. Enumerated Values: LIN = Linearly proportional to X-Ray beam intensity LOG = Logarithmically proportional to Xray beam intensity See C.8.11.3.1.2 for further explanation.
Pixel Intensity Relationship Sign	(0028,1041)	1	The sign of the relationship between the Pixel sample values stored in Pixel Data (7FE0,0010) and the X-Ray beam intensity. Enumerated Values; 1 = Lower pixel values correspond to less X-Ray beam intensity -1 = Higher pixel values correspond to less X-Ray beam intensity See C.8.11.3.1.2 for further explanation.
Rescale Intercept	(0028,1052)	1	The value b in the relationship between stored values (SV) in Pixel Data (7FE0,0010) and the output units specified in Rescale Type (0028,1054). Output units = m*SV + b. Enumerated Value: 0 See C.8.11.3.1.2 for further explanation.
Rescale Slope	(0028,1053)	1	m in the equation specified by Rescale Intercept (0028,1052). Enumerated Value: 1 See C.8.11.3.1.2 for further explanation.
Rescale Type	(0028,1054)	1	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). Enumerated Value: US = Unspecified See C.8.11.3.1.2 for further explanation.
Presentation LUT Shape	(2050,0020)	1	Specifies an identity transformation for the Presentation LUT, other than to account for the value of Photometric Interpretation (0028,0004), such that the output of all grayscale transformations defined in the IOD containing this Module are defined to be P-Values. Enumerated Values: IDENTITY - output is in P-Values - shall be used if Photometric Interpretation (0028,0004) is MONOCHROME2. INVERSE - output after inversion is in PValues - shall be used if Photometric Interpretation (0028,0004) is MONOCHROME1. See C.8.11.3.1.2 for further explanation.
Lossy Image Compression	(0028,2110)	1	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. See C.7.6.1.1.5 for further explanation.

Derivation Description	(0008,2111)	3	A text description of how this image was derived. See C.8.11.3.1.4 for further explanation.
Acquisition Device Processing Description	(0018,1400)	3	Indicates any visual processing performed on the images prior to exchange. See C.8.11.3.1.3 for further explanation.
Patient Orientation	(0020,0020)	1C	Patient direction of the rows and columns of the image. See C.7.6.1.1.1 for further explanation. Required if View Code Sequence (0054,0220) is not present or is present with an Item value other than (G-8300,SRT, “tissue specimen”) or (G-8310, SRT, “tissue specimen from breast”). May be present otherwise.
Burned In Annotation	(0028,0301)	1	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Values: YES NO
VOI LUT Sequence	(0028,3010)	1C	Defines a sequence of VOI LUTs.See C.8.11.3.1.5 for further explanation. One or more Items may be included in this Sequence. Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and Window Center (0028,1050) is not present. May also be present if Window Center (0028,1050) is present.
> LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See C.8.11.3.1.5 for further explanation.
> LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
> LUT Data	(0028,3006)	1C	LUT Data in this Sequence.
Window Center	(0028,1050)	1C	Defines a Window Center for display. See C.8.11.3.1.5 for further explanation. Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and VOI LUT Sequence (0028,3010) is not present. May also be present if VOI LUT Sequence (0028,3010) is present.
Window Width	(0028,1051)	1C	Window Width for display. See C.8.11.3.1.5 for further explanation. Required if Window Center (0028,1050) is sent.
Window Center and Width Explanation	(0028,1055)	3	Free form explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window Center and Width values.

Table 3-11 DX IMAGE MODULE ATTRIBUTES

4.5.6.2 DX Detector Module

Attribute Name	Tag	Ty	Attribute Description
Field of View Shape	(0018,114	3	Set to “RECTANGLE”

Field of View Dimensions	(0018,1149)	3	Dimensions in mm of the field of view, that is the image pixels stored in Pixel Data (7FE0, 0010). Row dimension / Columns dimension
Imager Pixel Spacing	(0018,1164)	1	Physical distance measured at the tabletop between the center of each image pixel projection specified by Row dimension and Column dimension. It should not be assumed to be always equal to Detector Element Spacing value
Sensitivity	(0018,600	3	Detector sensitivity in manufacturer specific units.
Detector Temperature	(0018,700	3	Sent if available
Detector Type	(0018,700	2	Set to “SCINTILLATOR”
Detector	(0018,700	3	Set to “AREA”
Detector ID	(0018,700	3	Sent if available
Detector Element Physical	(0018,7020)	3	Value 1 set to row physical dimension in mm. Value 2 set to column physical dimension in mm.
Detector Element Spacing	(0018,7022)	3	Physical distance between the center of each detector element specified by Row dimension and column dimension.
Detector Active Shape	(0018,702	3	Set to “RECTANGLE”
Detector Active Dimensions	(0018,7026)	3	Value 1 set to row active dimension in mm. Value 2 set to column active dimension in mm.
Field of View Origin	(0018,7030)	1C	Coordinates of the FOV upper left corner relative to the
Field of View Rotation	(0018,7032)	1C	Set to value of clockwise rotation in degrees of Field of View related to the physical detector.
Field of View Horizontalip	(0018,7034)	1C	Enumerated values: YES NO Sent if Field of View Rotation is sent.

Table 3-12 DX DETECTOR MODULE ATTRIBUTES

4.5.6.3 DX Positioning Module

The table in this Section contains IOD Attributes that describe the positioning used in acquiring the DX image.

Attribute Name	Tag	Type	Attribute Description
View Position	(0018,5101)	3	Radiographic view of the image relative to the imaging subject’s orientation. Shall be consistent with View Code Sequence (0054,0220). See C.8.11.5.1.1 for further explanation.

View Code Sequence	(0054,0220)		Sequence that describes the projection of the anatomic region of interest on the image receptor. Note: It is strongly recommended that this Attribute be resent, in order to ensure that images may be positioned correctly relative to one another for display. Shall be consistent with View Position (0018,5101). See C.8.11.5.1.1 for further explanation. Only a single Item shall be permitted in this Sequence.
> Code Value	(0008,0100)	3	
> Code Scheme Designator	(0008,0102)	3	
> Code Meaning	(0008,0104)	3	
>View Modifier Code Sequence	(0054,0222)	3	View modifier. Zero or more Items may be included in this Sequence
>> Code Value	(0008,0100)	3	
>> Code Scheme Designator	(0008,0102)	3	
>> Code Meaning	(0008,0104)	3	
Patient Orientation Code Sequence	(0054,0410)	3	Sequence that describes the orientation of the patient with respect to gravity. See C.8.11.5.1.2 for further explanation. Only a single Item shall be permitted in this Sequence.
> Code Value	(0008,0100)	3	
> Code Scheme Designator	(0008,0102)	3	
> Code Meaning	(0008,0104)	3	
>Patient Orientation Modifier Code Sequence	(0054,0412)	3	Patient Orientation Modifier. Sequence Required if needed to fully specify the orientation of the patient with respect to gravity. Only a single Item shall be permitted in this Sequence.
>> Code Value	(0008,0100)	3	
>> Code Scheme Designator	(0008,0102)	3	
>> Code Meaning	(0008,0104)	3	

Patient Gantry Relationship Code Sequence	(0054,0414)	3	Sequence which describes the orientation of the patient with respect to the gantry. Only a single Item shall be permitted in this Sequence.
> Code value	(0008,0100)	1C	
> Coding Scheme Designator	(0008,0102)	1C	
> Code Meaning	(0008,0104)		
Distance Source to Patient	(0018,1111)	3	Distance in mm from source to the table, support or bucky side that is closest to the Imaging Subject, as measured along the central ray of the X-Ray beam. Note: 1. This definition is less useful in terms of estimating geometric magnification than a measurement to a defined point within the Imaging Subject, but accounts for what is realistically measurable in an automated fashion in a clinical setting. 2. This measurement does not take into account any air gap between the Imaging Subject and the "front" of the table or bucky. 3. If the detector is not mounted in a table or bucky, then the actual position relative to the patient is implementation or operator defined. 4. This value is traditionally referred to as Source Object Distance (SOD). See C.8.11.7 Mammography Image Module for explanation if Positioner Type (0018,1508) is MAMMOGRAPHIC.
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center. Note: This value is traditionally referred to as Source Image Receptor Distance (SID). See C.8.11.7 Mammography Image Module for explanation if Positioner Type (0018,1508) is MAMMOGRAPHIC.

Positioner Type	(0018,1508)	2	Defined Terms: CARM COLUMN MAMMOGRAPHIC PANORAMIC CEPHALOSTAT RIGID NONE Notes: 1. The term CARM can apply to any positioner with 2 degrees of freedom of rotation of the X-Ray beam about the Imaging Subject. 2. The term COLUMN can apply to any positioner with 1 degree of freedom of rotation of the X-Ray beam about the Imaging Subject.

Table 3-14 DX POSITIONING MODULE ATTRIBUTES

4.5.6.4 X-ray Acquisition Dose Modules

This section specifies the Attributes that describe the acquisition parameters used when acquiring the image.

Attribute Name	Tag	Type	Attribute Description
KVP	(0018,0060)	3	Peak kilo voltage output of the X-Ray generator used.
Image Area Dose Product	(0018,115E)	3	X-Ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of this image plus any nondigitally recorded fluoroscopy which may have been performed to prepare for the acquisition of this image. Notes: 1. The sum of the area dose product of all images of a Series or a Study may not result in the total area dose product to which the patient was exposed. 2. This may be an estimated value based on assumptions about the patient's body size and habitus.
Exposure Time	(0018,1150)	3	Duration of X-Ray exposure in msec.
X-ray Tube Current	(0018,1151)	3	X-Ray Tube Current in mA.
Exposure	(0018,1152)	3	The exposure expressed in mAs, for example calculated from Exposure Time and X-Ray Tube Current.

Exposure in µAs	(0018,1153)	3	The exposure expressed in µAs, for example calculated from Exposure Time and X-Ray Tube Current.
Target Exposure Index	(0018,1412)	3	The target value used to calculate the Deviation Index (0018,1413) as defined in IEC 62494-1.
Deviation Index	(0018,1413)	3	A scaled representation of the difference of the Exposure Index compared to the Target Exposure Index as defined in IEC 62494-1 and the report of AAPM TG 116.

Table 3-15 X-RAY ACQUISITION DOSE MODULE ATTRIBUTES

4.5.6.5 Overlay Plane module

An Overlay Plane describes graphics or bit-mapped text that is associated with an Image or has it own existence within a Series. It may also describe a region of Interest in an Image.

Each Overlay Plane is one bit deep. Sixteen separate Overlay Planes may be associated with an Image or exist as Standalone Overlays in a Series

Attribute Name	Tag	Type	Attribute Description
Overlay Rows	(6000,0010)	1	Number of Rows in Overlay
Overlay Columns	(6000,0011)	1	Number of Columns in Overlay.
Overlay Type	(6000,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Value = G
Overlay Subtype	(6000,0045)	3	Defined term that identifies the intended purpose of the Overlay Type. Value = USER
Overlay Origin	(6000,0050)	1	Location of first Overlay point with respect to pixels in the image given as row/column. Value = 1\1
Overlay Bits Allocated	(6000,0100)	1	Number of bits allocated in the overlay. Value = 1
Overlay Bit Position	(6000,0102)	1	Bit in which Overlay is stored. Value = 0
Overlay Data	(6000,3000)	1	Overlay Pixel Data

Table 3-19 OVERLAY PLANE MODULES

4.5.6.6 VOI LUT Module

The table in this Section contains IOD Attributes that describe the VOI LUT

Attribute Name	Tag	Type	Attribute Description

VOI LUT Sequence	(0028,3010)	3	Up to 4 items can be present in this sequence. Sequence is only present when the system is configured to generate the VOI LUT Sequence.
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
>LUT Data	(0028,3006)	1C	LUT data in this sequence. Required if the VOI LUT Sequence is sent.
Window Center	(0028,1050)	3	Sent in DX For Presentation Images. Up to four values are present in the For Presentation DX images. The fourth value is present when the operator adjusts and saves the window center during image review. The other values are defined as preset values (Normal, Harder, Softer) during acquisition.
Window Width	(0028,1051)	1C	Sent in DX For Presentation Images. Up to four values are present in the For Presentation DX images. The fourth value is present when the operator adjusts and saves the window width during image review. The other values are defined as preset values (Normal, Harder, Softer) during acquisition.
Window Center & Width Explanation	(0028,1055)	3	Sent in DX For Presentation Images. Up to four values are present.

Table 3-20 VOI LUT MODULE ATTRIBUTES

4.5.6.7 Acquisition Context Module

Attribute Name	Tag	Type	Attribute Description
Acquisition Context Sequence	(0040,0555)	2	Zero length value is sent unless it is necessary to convey concept of flexion or extension, in which case one item is sent.
>Concept-name Code Sequence	(0040,A043)	1C	One item is sent in this sequence if it is necessary as explained above.
>>Code Value	(0008,0100)	1C	
>>Coding Scheme Designator	(0008,0102)	1C	
>>Code Meaning	(0008,0104)	1C	
>Concept Code Sequence	(0040,A168)	1C	
>>Code Value	(0008,0100)	1C	
>>Coding Scheme Designator	(0008,0102)	1C	
>>Code Meaning	(0008,0104)	1C	

Table 3-21 ACQUISITION CONTEXT MODULE ATTRIBUTES

4.5.6.8 SOP Common Module

This section defines the Attributes that are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Set to ISO_IR 100 = Latin Alphabet No. 1
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	

Table 3-22 SOP COMMON MODULE ATTRIBUTES

4.5.6.9 Icon Image module

The table in this Section contains IOD Attributes that describe the icon image

Attribute Name	Tag	Type	Attribute Description
Icon Image Sequence	(0088,0200)	3	
>Samples Per Pixel	(0028,0002)	1C	Always set to 1
>Photometric Interpretation	(0028,0004)	1C	Always set to “MONOCHROME2”
>Rows	(0028,0010)	1C	Always <= 64
>Columns	(0028,0011)	1C	Always <= 64
>BitsAllocated	(0028,0100)	1C	Always equal to 8
>BitsStored	(0028,0101)	1C	Always equal to 8
>HighBit	(0028,0102)	1C	Always equal to 7
>Pixel Representation	(0028,0103)	1C	Always equal to 0
>Pixel Data	(7FE0,0010)	1C	

Table 3-23 ICON IMAGE MODULE ATTRIBUTES

4.5.6.10 Image Plane Module

Attribute Name	Tag	Typ	Attribute Description
Slice Thickness	(0018,0050)	2	Nominal Slice thickness in mm. The value could be empty. Present in Tomosynthesis – FOR
Pixel Spacing	(0028,0030)	1	Present in Tomosynthesis – FOR PRESENTATION images only
Slice Location	(0020,1041)	3	Present in Tomosynthesis – FOR PRESENTATION images only. Equivalent to image layer height.

Table 3-27 IMAGE PLANE MODULE ATTRIBUTES

4.5.7 Application Module (Private Module)

Application Module is a private module.

The table in this Section contains Attributes that describe various information required by the BRIVO Acquisition Workstation Medical Application.

TABLE 4-28
APPLICATION MODULE PRIVATE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Private Creator	(0011,0010)	1	GEMS_GDXE_FALCON_04
Processed Series UID	(0011,1003)	3	Processed Series UID
Acquisition Type	(0011,1004)	3	Acquisition Type
Acquisition UID	(0011,1005)	3	Acquisition UID
Image Dose	(0011,1006)	3	Image Dose. Not present in Tomosynthesis Slice images – For Presentation
Non-Digital Exposures	(0011,1009)	3	Non-Digital Exposures
Total Exposures	(0011,1010)	3	Total Exposures
ROI	(0011,1011)	3	ROI
Patient Size String	(0011,1012)	3	Patient Size String
SPS UID	(0011,1013)	3	SPS UID
Detector ARC Gain	(0011,1015)	3	Detector ARC Gain
Processing Debug Info	(0011,1016)	3	Processing Debug Info
Override mode	(0011,1017)	3	DISABLE/ENABLE
Film Speed Selection	(0011,1019)	3	Film Speed Selection
Detected Field of View	(0011,1031)	3	Actual collimator FOV
Adjusted Field of View	(0011,1032)	3	Output of ICED algorithm Value from user manual adjustment. **Note:** When the collimator is rotated, the stored vertices are those of the rectangle circumscribing the polygonal collimator.
Detected Exposure Index	(0011,1033)	3	Detected Exposure Index
Compensated Detector Exposure	(0011,1034)	3	Compensated Detector Exposure
Uncompensated Detector Exposure	(0011,1035)	3	Uncompensated Detector Exposure
Median Anatomy Count Value	(0011,1036)	3	Median Anatomy count value
DEI lower and upper limit values	(0011,1037)	3	DEI lower and upper limit values
Shift Vector for Pasting	(0011,1038)	3	Present only in pasted images.

Attribute Name	Tag	Type	Attribute Description
Image Number for Pasting	(0011,1039)	3	In sub-images indicates the sub-image number (1/3, 2/3, etc). In Pasted image is equal to the number of sub-images used for pasting. In Tomo indicates the instance number of the total images in the series (2/60).
Pasting Overlap	(0011,1040)	3	Amount of overlap. Only in pasted image.
Sub-image collimator Vertices	(0011,1041)	3	Only in pasted image. Collimator vertices of the sub-images.
View IP	(0011,1042)	3	View prescribed
Key Stone Co-ordinates	(0011,1043)	3	Only in pasted image. Co-ordinates of the keystone used for cropping the image.
Receptor Type	(0011,1044)	3	Table or WallStand
Conversion Factor	(0011,1047)		Calibration for a specified detector
Focal Spot Positions (x,y,z)	(0011,1048)	3	Present only in Tomosynthesis Projection Images
Frame Rate	(0011,1051)	3	Present only in Tomosynthesis Projection and Slice images
Tube to Detector Angle	(0011,1052)	3	Present only in Tomosynthesis Projection Images
OTS Column Rotation Angle	(0011,1053)	3	Present only in Tomosynthesis Projection Images
Start Height	(0011,1054)	3	Present in Tomosynthesis Projection and Slice images. These are the Recon parameters in mm
End Height	(0011,1055)	3	Present in Tomosynthesis Projection and Slice images. These are the Recon parameters in mm
Sampling Factor	(0011,1056)	3	Present in Tomosynthesis Projection and Slice images.
Sweep Direction	(0011,1057)	3	Present in Tomosynthesis Projection and Slice images.
Slice Interval	(0011,1058)	3	Present in Tomosynthesis Projection and Slice images. These are the Recon parameters in mm
Grid Position	(0011,1059)	3	Determines the orientation of the Grid
Wallstand Position	(0011,1060)	3	Position of Wallstand housing
RRA Classification	(0011,1062)	3	Only present if RRA is enabled. Only present in Presentation Images. RRA classification for repeat acquisitions, for unnecessary images for non-clinical images is filled in this tag.
RRA Reason	(0011,1063)	3	Only present if RRA is enabled. Only present in Presentation Images. Values consists of reason for repeat acquisition.
Detector Type	(0011,1064)	3	Type of detector used during exposure
Derived Receptor Type	(0011,1065)	3	Type of receptor used during exposure, applicable to the HW configuration of Discovery XR650. Not present in Digital Cassette images.
Extension Cable In Use	(0011,1066)	3	Indicates if the extension cable was in use

Attribute Name	Tag	Type	Attribute Description
Detector Port In Use	(0011,1067)	3	Table port in use
Mac Address	(0011,1068)	3	Detector Mac Address
Detector Height Correction	(0011,1069)	3	Distance from Detector to the Table/WS patient barrier. This tag is only used for the Tomo Recon feature.
Default Normal LUT	(0011,106B)	3	LUT for JEG conversion. Only present in Presentation Images.
Uncompensated Sensitivity	(0011,106D)	3	Is defined as the conversion efficiency of the detector
Private Creator	(0045,0010)	1	GEMS_FALCON_03
A_Coefficients	(0045,1055)	3	Used in Multi-resolution Algorithm
User Window Center	(0045,1062)	3	User Window Center
User Window Width	(0045,1063)	3	User Window Width
Requested Detector Entrance Dose	(0045,1065)	3	Requested detector entrance dose in units of nanoGray.
VOI LUT Asymmetry parameter beta	(0045,1067)	3	Used for calculating Asymmetric LUT
Collimator rotation	(0045,1069)	3	0: No collimator rotation; 1: Collimator Rotation
Private Creator	(7FDF,0010)	1	GEMS_GDXE_ATHENAV2_INTERNAL_USE
PPS Stream	(7FDF,1010)	3	Pixel Data References
Auto Push Tag	(7FDF,1020)	3	Auto Push Tag
PPS Status	(7FDF,1025)	3	PPS Status

4.6 PRIVATE DATA DICTIONARY

TABLE 4-29
PRIVATE CREATOR IDENTIFICATION (GEMS_FALCON_03)

Attribute Name	Tag	VR	VM
Private Creator	(0011,0010)	LO	1
Processed Series UID	(0011,1003)	UI	1
Acquisition Type	(0011,1004)	CS	1
Acquisition UID	(0011,1005)	UI	1
Image Dose	(0011,1006)	DS	1
Non-Digital Exposures	(0011,1009)	SL	1
Total Exposures	(0011,1010)	SL	1
ROI	(0011,1011)	LT	1
Patient Size String	(0011,1012)	LT	1
SPS UID	(0011,1013)	UI	1
Detector ARC Gain	(0011,1015)	DS	1
Processing Debug Info	(0011,1016)	LT	1

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Attribute Name	Tag	VR	VM
Override mode	(0011,1017)	CS	1
Film Speed Selection	(0011,1019)	DS	1
Detected Field of View	(0011,1031)	IS	8
Adjusted Field of View	(0011,1032)	IS	8
Detected Exposure Index	(0011,1033)	DS	1
Compensated Detector Exposure	(0011,1034)	DS	1
Uncompensated Detector Exposure	(0011,1035)	DS	1
Median Anatomy Count Value	(0011,1036)	DS	1
DEI lower and upper limit values	(0011,1037)	DS	2
Shift Vector for Pasting	(0011,1038)	SL	6
Image Number in Pasting	(0011,1039)	CS	1
Pasting Overlap	(0011,1040)	SL	1
Sub-image Collimator Vertices	(0011,1041)	IS	24
View IP	(0011,1042)	LO	1
Key-stone Co-ordinates	(0011,1043)	IS	24
Receptor Type	(0011,1044)	CS	1
Conversion Factor	(0011,1047)	DS	1
Grid Position	(0011,1059)	CS	1
Wallstand Position	(0011,1060)	CS	1
RRA Classification	(0011,1062)	CS	1
RRA Reason	(0011,1063)	US	1
Detector Type	(0011,1064)	CS	1
Derived Receptor Type	(0011,1065)	CS	1
Extension Cable In Use	(0011,1066)	CS	1
Detector Port In Use	(0011,1067)	CS	1
Mac Address	(0011,1068)	CS	1
Detector Height Correction	(0011,1069)	CS	1
Default Normal LUT	(0011,106B)	CS	n
Uncompensated Sensitivity	(0011,106D)	DS	1
Private Creator	(0045,0010)	LO	1
A_Coefficients	(0045,1055)	DS	8
User Window Center	(0045,1062)	IS	1
User Window Width	(0045,1063)	IS	1
Requested Detector Entrance Dose	(0045,1065)	IS	1
VOI LUT Asymmetry parameter beta	(0045,1067)	DS	3
Collimator rotation	(0045,1069)	IS	1
Collimator Width	(0045,1072)	DS	1

Attribute Name	Tag	VR	VM
Collimator Height	(0045,1073)	DS	1
Private Creator	(7fdf, 0010)	LO	1
PPS Stream	(7fdf, 1010)	LT	1
Auto Push Tag	(7fdf, 1020)	SS	1
PPS Status	(7fdf, 1025)	CS	1

Table 3-29 PRIVATE CREATOR IDENTIFICATION (GEMS_FALCON_03)

5. MODALITY WORKLIST INFORMATION MODEL DEFINITION

5.1 INTRODUCTION

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed. The contents of this section are:

6.2 - Information Model Description

6.3 - Information Model Entity-Relationship Model

6.4 - Information Model Module Table

6.5 - Information Model Keys.

5.2 MODALITY WORKLIST INFORMATION MODEL DESCRIPTION

In order to serve as a Service Class Provider (SCP) of the Modality Worklist Service Class, a DICOM Application Entity (AE) possesses information about the attributes of a number of managed worklist items. These items are organized into Modality Worklist Information Modules. In this Service Class, the Information Model plays a role similar to an Information Object Definition of most other DICOM Service Classes.

5.3 MODALITY WORKLIST INFORMATION MODEL ENTITY-RELATIONSHIP MODEL

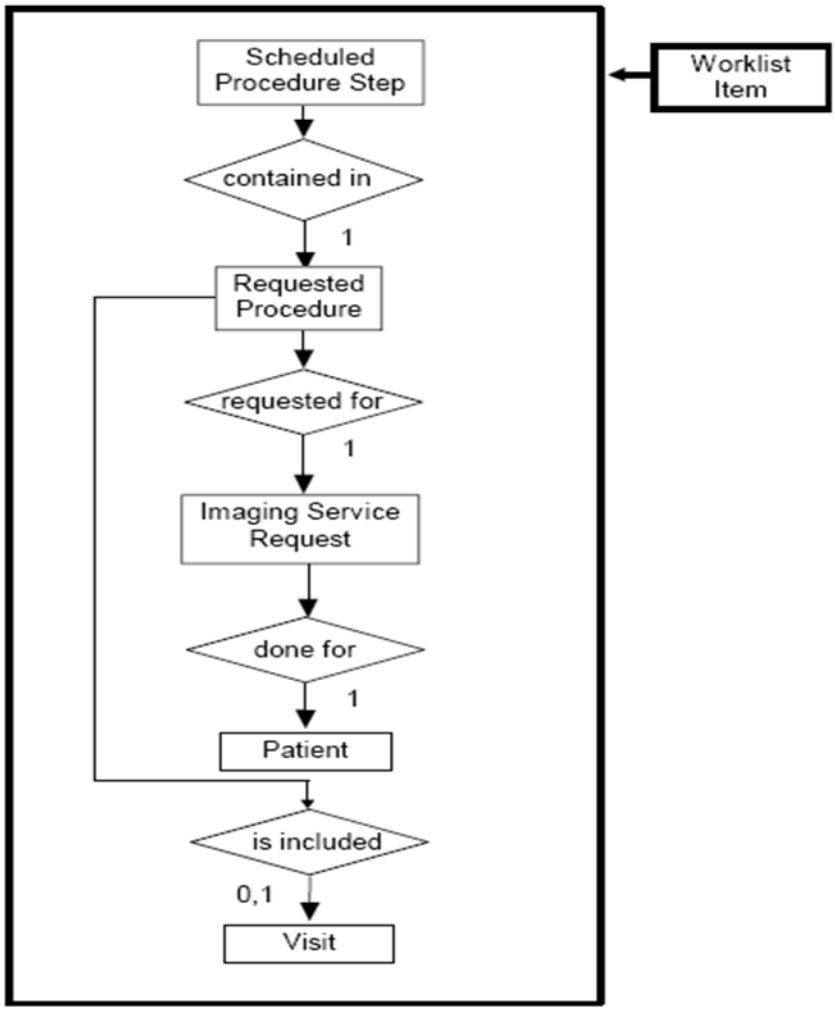
The Entity-Relationship diagram for the Modality Worklist Information Model schema is shown in Illustration 6-1. It represents the information that composes a Worklist Item. In this figure, the following diagrammatic convention is established to represent the information organization:

• each entity is represented by a rectangular box

• each relationship is represented by a diamond shaped box.

• the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

ILLUSTRATION 6-1
MODALITY WORKLIST INFORMATION MODEL E/R DIAGRAM



5.3.1 Entity Descriptions

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

5.3.1.1 Scheduled Procedure Step

A Scheduled Procedure Step is an arbitrarily defined scheduled unit of service that is specified by the Procedure Plan for a Requested Procedure. It specifies one or more Action Items (events) involving equipment (i.e. imaging modality quipment), human resources, location and time (i.e. start time, stop time, duration).

5.3.1.2 Requested Procedure Entity Description

A Requested Procedure is an instance of a Procedure of a given Procedure Type. An instance of a Requested Procedure includes all of the items of information that are specified by an instance of a Procedure Plan that is selected for the Requested Procedure by the imaging service provider.

5.3.1.3 Imaging Service Request Entity Description

An Imaging Service Request is a set of one or more Requested Procedures selected from a list of Procedure Types. An Imaging Service Request is submitted by one authorized imaging service requester to one authorized imaging service provider in the context of one Service Episode.

5.3.1.4 Visit Entity Description

A Visit is the context in which the treatment or management of an arbitrary subset of a Patient's medical conditions occurs. A Visit is limited to the description of a Patient's activities at a single facility.

5.3.1.5 Patient Entity Description

A Patient is a person receiving, or registered to receive, healthcare services.

5.3.2 Brivo XR118 Acquisition Workstation Mapping of DICOM entities

DICOM	Brivo XR118 Acquisition Workstation Entity
Scheduled Procedure Step	Series
Requested Procedure	Study / Exam
Imaging Service Request	Study / Exam
Visit	Study / Exam
Patient	Patient

Table 3-37 MAPPING OF DICOM ENTITIES TO Brivo XR118 ACQUISITION WORKSTATION ENTITIES

5.4 INFORMATION MODEL MODULE TABLE

Within an entity of the DICOM V3.0 Modality Worklist Information Model, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.

Table 6-2 identifies the defined modules within the entities that comprise the DICOM V3.0 Modality Worklist Information Model. Modules are identified by Module Name.

See DICOM V3.0 PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	6.5.2.1
	Scheduled Procedure Step	6.5.2.2
Requested Procedure	Requested Procedure	6.5.3.1
Imaging Service Request	Imaging Service Request	6.5.4.1
Visit	Visit Identification	6.5.5.1
	Visit Status	6.5.5.2
	Visit Relationship	6.5.5.3

	Visit Admission	6.5.5.4
Patient	Patient Relationship	6.5.6.1
	Patient Identification	6.5.6.2
	Patient Demographic	6.5.6.3
	Patient Demographic	6.5.6.3

Table 3-38 MODALITY WORKLIST INFORMATION MODEL MODULES

5.5 INFORMATION MODEL KEYS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

The following Module descriptions are included to specify what data elements are supported and what type of matching can be applied. It should be noted that they are the same ones as defined in the DICOM V3.0 Standard PS 3.4 (Service Class Specifications) and include:

- Name
- Tag group and element numbers
- Expected Matching Key Type: R-required, O-optional
- Expected Return Key Type:

− 1 - non-zero value required

− 1C - conditionally of type 1

− 2 - required to be present, possibly with zero-length value

− 2C - conditionally of type 2

− 3 - optional

- Mapped into The Image - whether this data is mapped into subsequently acquired images
- Notes - clarification of this implementation's use/treatment of this attribute

All data elements in the following Module descriptions are requested by default by the Worklist Server AE.

Data elements for which values can be sent for matching purposes are described as such. Data elements for which values are not sent are sent with zero length and universal matching will apply. This is the default case if no other description to the contrary is provided.

5.5.1 Supported Matching

Following are the types of matching that can be request by the implementation:

− Single Value matching

- Universal Matching

- Range of date, Range of Time

5.5.2 Scheduled Procedure Step Entity

5.5.2.1 SOP Common Module

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Displayed to User	Updatable by User	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	N/A	N/A	
>Scheduled Station AE Title	(0040,0001)	R	1	No	No	No	Matching is supported as follows: either no AE title is supplied (universal matching), or the Query AE title (See Note) is supplied for matching; this is user selectable.
>Scheduled Procedure Step Start Date	(0040,0002)	R	1	No	Yes	No	Matching is supported as one of the following; this is user selectable: • today only, • tomorrow only, • from date1 to date2, date1 and date2 being defined by user Returned values must be exactly 8 numeric characters, in YYYYMMDD or YYYY.MM.DD format

>Modality	(0008,0060)	R	1	Yes	Yes	No	Matching is supported as follows: either no Modality is supplied (universal matching), or the system's Modality is supplied (i.e.DX) for matching: this is user selectable.
>Scheduled Performing Physician's Name	(0040,0006)	R	2	Yes	Yes	Yes	
>Scheduled Procedure Step Description	(0040,0007)	O	1C	Yes	Yes	Yes If not provided by HIS	
>Scheduled Action Item Code Sequence	(0040,0008)	O	1C	No	No	No	
>>Code Value	(0008,0100)	O	1C	No	No	No	
>>Coding Scheme Designator	(0008,0102)	O	1C	No	No	No	
>>Code Meaning	(0008,0104)	O	3	No	No	No	
>Scheduled Procedure Step ID	(0040,0009)	O	1	No	No	No	

Table 3-40 SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

5.5.3 Requested Procedure Entity

5.5.3.1 Requested Procedure Module

Attribute Name	Tag	Expected Matching Key Type	Expeced Returned Key Type	Mapped into the Image	Displayed to User	Updatable by User	Note
Requested Procedure ID	(0040,1001)	O	1	Yes	Yes	No	
Requested Procedure Description	(0032,1060)	O	1C	Yes	Yes	Yes If not provided by HIS	

Requested Procedure Code Sequence	(0032,1064)	O	1C	Yes	No	No	
>Code Value	(0008,0100)	O	1C	Yes	No	No	
>Coding Scheme Designator	(0008,0102)	O	1C	Yes	No	No	
>Code Meaning	(0008,0104)	O	3	Yes	No	No	
Study Instance	(0020,000D)	O	1	Yes	No	No	
Referenced Study Sequence	(0008,1110)	O	2	Yes	No	No	
>Referenced SOP Class UID	(0008,1150)	O	1C	Yes	No	No	
>Referenced SOP Instance UID	(0008,1155)	O	1C	Yes	No	No	

Table 3-41 REQUESTED PROCEDURE MODULE ATTRIBUTES

5.5.4 Imaging Service Request Entity

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Displayed to User	Updatable by User	Note
Accession Number	(0008,0050)	O	2	Yes	Yes	Yes if not provided by HIS	
Referring Physician's Name	(0008,0090)	O	2	Yes	Yes	Yes	

Table 3-42 IMAGING SERVICE REQUEST MODULE ATTRIBUTES

5.5.5 Visit Entity

5.5.5.1 Visit Identification

None of the data element from Visit Identification Module are requested.

5.5.5.2 Visit Status

None of the data element from Visit Status Module are requested.

5.5.5.3 Visit Relationship

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Displayed to User	Updatable by User	Note
Referenced Patient Sequence	(0008,1120)	O	2	Yes	No	No	
>Referenced SOP Class UID	(0008,1150)	O	2	Yes	No	No	
>Referenced SOP Instance UID	(0008,1155)	O	2	Yes	No	No	

Table 3-43 VISIT RELATIONSHIP MODULE ATTRIBUTES

5.5.5.4 Visit Admission

None of the data elements from Visit Admission Module are requested.

5.5.6 Patient Entity

5.5.6.1 Patient Relationship

None of the data elements from Patient Relationship Module are requested.

Attribut e Name	**Tag**	**Expect ed Matchi**	**Expected Returned Key Type**	**Mapped into the Image**	**Displayed to User**	**Updatable by User**	**Note**
Patient's Name	(0010,0010)	R	1	Yes	Yes	Yes if not provided by HIS	Matching is supported as follow: either no patient name is supplied (universal matching), or the patient name entered by the user in the Query Definition screen is supplied for matching
Patient ID	(0010,002)	R	1	Yes	Yes	Yes if not provided by HIS	Matching is supported as follow: either no patient ID is supplied (universal matching), or the patient ID entered by the user in the Query Definition screen is supplied for matching

Table 3-44 PATIENT IDENTIFICATION MODULE ATTRIBUTES

5.5.6.2 Patient Demographic

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Displayed to User	Updatable by User	Note
Patients Birth Date	(0010,0030)	O	2	Yes	Yes	Yes	Yes
Patient's Sex	(0010,0040)	O	2	Yes	Yes	Yes	Yes

Table 3-45 PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

5.5.6.3 Patient Medical

None of the data elements from Patient Medical Module are requested.

5.6 PRIVATE DATA DICTIONARY

The Brivo XR118 Acquisition Workstation implementation does not define any Private Attributes within the Modality Worklist Information Model.

6. MODALITY PERFORMED PROCEDURE STEP IMPLEMENTATION

6.1 MODALITY PERFORMED PROCEDURE STEP MODULE TABLE

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

Module Name	Reference
SOP Common	C.12.1
Performed Procedure Step Relationship	C.4.13
Performed Procedure Step Information	C.4.14
Image Acquisition Results	C.4.15
Radiation Dose	C.4.16
Billing and Material Management Codes	Not Supported

Table 3-5 MODALITY PERFORMED PROCEDURE STEP MODULES

6.2 MODALITY PERFORMED PROCEDURE STEP MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the attributes contained within the Modality Performed Procedure Step Information Object Definition.

6.2.1 SOP Common Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Specific Character Set	(0008,0005)	1C	1C	Not used but copied into the MPPS Object

Table 3-6 SOP COMMON MODULE ATTRIBUTES

6.2.2 Performed Procedure Step Relationship Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Patient's Name	(0010,0010)	2	-	Copied from the SPS.
Patient ID	(0010,0020)	2	-	Copied from the SPS.
Patient's Birth Date	(0010,0030)	2	-	Copied from the SPS.
Patient's Sex	(0010,0040)	2	-	Copied from the SPS.
Referenced Patient Sequence	(0008,1120)	2	-	Copied from the SPS.
>Referenced SOP Class UID	(0008,1150)			Copied from the SPS.
>Referenced SOP Instance UID	(0008,1155)			Copied from the SPS.
Scheduled Step Attributes Sequence	(0040,0270)	1	-	Copied from the SPS.
>Study Instance UID	(0020,000D)	1	-	Copied from the SPS.
>Referenced Study Sequence	(0008,1110)	2	-	Copied from the SPS.
>>Referenced SOP Class UID	(0008,1150)			Copied from the SPS.
>>Referenced SOP Instance UID	(0008,1155)			Copied from the SPS.
>Accession Number	(0008,0050)	2	-	Copied from the SPS.
>Requested Procedure ID	(0040,1001)	2	-	Copied from the SPS.
>Requested Procedure Description	(0032,1060)	2	-	Copied from the SPS.
>Scheduled Procedure Step ID	(0040,0009)	2	-	Copied from the SPS.
>Scheduled Procedure Step	(0040,0007)	2	-	Copied from the SPS.
>Scheduled Protocol Code Sequence	(0040,0008)	2	-	Copied from the SPS.
>> 'Code Sequence Macro'				Copied from the SPS.

Table 3-7 PERFORMED PROCEDURE STEP RELATIONSHIP MODULE ATTRIBUTES

6.2.3 Performed Procedure Step Information Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Station AE Title	(0040,0241)	1	-	Local System AE Title
Performed Station Name	(0040,0242)	2	-	Local Station Name as configured in
				Service User Interface
Performed Location	(0040,0243)	2	-	Local System ID as configured in
				Service User Interface

Performed Procedure Step	(0040,0244)	1	-	Same as Start Exam Date
Start				
Date				
Performed Procedure Step	(0040,0245)	1	-	Same as Start Exam Time
Start Time				
Performed Procedure Step	(0040,0253)	1	-	Created by the Acquisition
ID				
Performed Procedure Step	(0040,0250)	2	3	The Date when Complete PPS/
End Date				Discontinue PPS is invoked from
				UI.
Performed Procedure Step	(0040,0251)	2	3	The Time when Complete PPS/
End Time				Discontinue PPS is invoked from
				UI.
Performed Procedure Step	(0040,0252)	1	3	See Note 1 at the end of this Table
Status				
Performed Procedure Step	(0040,0254)	2	3	Copied from SPS
Description				
Comments on the	(0040,0280)	3	3	
Procedure Step				
Performed Procedure Type	(0040,0255)	2	3	
Description				
Procedure Code Sequence	(0008,1032)	2	3	Not sent as part of MPPS Object
> 'Code Sequence Macro'				Not sent as part of MPPS Object
Performed Procedure Step	(0040,0281)	3	3	Sent when exam is Discontinued
Discontinuation Reason				and carries discontinue reason as
Code Sequence				selected by the User on the UI.
> 'Code Sequence Macro'				

Table 3-8 PERFORMED PROCEDURE STEP INFORMATION MODULE ATTRIBUTES

Note 1:

- When PPS Start (N-CREATE) message is sent, this element will have the value "INPROGRESS"
- When PPS end (N-SET) message is sent, this element will have either "COMPLETE" or"DICONTINUE".

6.2.4 Image Acquisition Results Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Modality	(0008,0060)	1	-	DX

Study ID	(0020,0010)	2	-	
Performed Protocol Code Sequence	(0040,0260)	2	3	
> 'Code Sequence Macro'				
Performed Series Sequence	(0040,0340)	2	3	One item per series created
>Performing Physician's Name	(0008,1050)	2	2	Copied from SPS/ UI selection
>Operator's Name	(0008,1070)	2	2	Copied from SPS/ UI
>Protocol Name	(0018,1030)	1	1	Copied from SPS/ UI
>Series Instance UID	(0020,000E)	1	1	System generated UID
>Series Description	(0008,103E)	2	2	Copied from SPS/ UI
>Retrieve AE Title	(0008,0054)	2	2	Local System AE Title
>Referenced Image	(0008,1140)	2	2	One item per each image
>>Referenced SOP Class	(0008,1150)	1	1	
>>Referenced SOP	(0008,1155)	1	1	
>Referenced Non-Image	(0040,0220)	2	2	Not Sent
>>Referenced SOP Class	(0008,1150)	1	1	Not Sent
>>Referenced SOP	(0008,1155)	1	1	Not Sent

Table 3-9 IMAGE ACQUISITION RESULTS MODULE ATTRIBUTES

6.2.5 Radiation Dose Module

Attibute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	USE
Anatomic Structure, Space or Region Sequence	(0008,2229)	3	3	Carries the same value as in Anatomic region value (0008,2218)
> Code Sequence Macro				Not Sent
Total Time of Fluoroscopy	(0040,0300)	3	3	Not Sent
Total Number of Exposures	(0040,0301)	3	3	Total number of acquisitions performed during this PPS

Distance Source to Detector (SID)	(0018,1110)	3	3	
Distance Source to Entrance	(0040,0306)	3	3	
Entrance Dose	(0040,0302)	3	3	Cumulative entrance dose for the PPS
Entrance Dose in mGy	(0040,8302)	3	3	Cumulative entrance dose for the PPS
Exposed Area	(0040,0303)	3	3	
Image Area Dose Product	(0018,115E)	3	3	Cumulative Dose area product for the PPS
Comments on Radiation Dose	(0040，0310)	3	3	Comments sent if the PPS includes a Non Digital acquisition
Exposure Dose Sequence	(0040,030E)	3	3	Information carried from each source image
>Radiation Mode	(0018,115A)	3	3	
kVp	(0018,0060)	3	3	
>X-ray Tube Current inμA	(0018,8151)	3	3	
>Exposure Time	(0018,1150)	3	3	
>Filter Type	(0018,1160)	3	3	
>Filter Material	(0018,7050)	3	3	

Table 3-10 RADIATION DOSE MODULE ATTRIBUTES

6.2.6 Billing and Material Management Codes Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Billing Procedure Step	(0040,0320)	3	3	Not Sent
> 'Code Sequence Macro'				Not Sent
Film Consumption Sequence	(0040,0321)	3	3	Not Sent
>Number of Films	(2100,0170)	3	3	Not Sent
>Medium Type	(2000,0030)	3	3	Not Sent
>Film Size ID	(2010,0050)	3	3	Not Sent
Billing Supplies and Devices	(0040,0324)	3	3	Not Sent
>Billing Item Sequence	(0040,0296)	3	3	Not Sent
>> 'Code Sequence Macro'				Not Sent
>Quantity Sequence	(0040,0293)	3	3	Not Sent
>>Quantity	(0040,0294)	3	3	Not Sent
>>Measuring Units Sequence	(0040,0295)	3	3	Not Sent
>>> 'Code Sequence Macro'				Not Sent

Table 3-11 BILLING AND MATERIAL MANAGEMENT CODES MODULE ATTRIBUTES

6.3 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

Not Present

6.4 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

Not Present

7. STORAGE COMMITMENT PUSH MODEL IMPLEMENTATION

7.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Storage Commitment Push Model SOP Class, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

7.2 STORAGE COMMITMENT PUSH MODEL SOP CLASS DEFINITION

7.2.1 IOD Description

7.2.1.1 STORAGE COMMITMENT MODULE

Attribute Name	Tag	Attribute Description
Retrieve AE Title	(0008,0054)	When received in N-EVENT-REPORT, it is supported but ignored.
Transaction UID	(0008,1195)	
Storage Media File-Set ID	(0088,0130)	When received in N-EVENT-REPORT, it is supported but ignored.
Storage Media File-Set UID	(0088,0140)	When received in N-EVENT-REPORT, it is supported but ignored.
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
>Retrieve AE Title	(0008,0054)	Supported but ignored
>Storage Media File-Set ID	(0088,0130)	Supported but ignored
>Storage Media File-Set UID	(0088,0140)	Supported but ignored
Referenced Study Component Sequence	(0008,1111)	Not sent
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Failed SOP Sequence	(0008,1198)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
>Failure Reason	(0008,1197)	All values from the following table are supported

Table 3-1 STORAGE COMMITMENT MODULE

Failure	Meaning	SCU Behavior

0110H	Processing failure	Logged into log file Pop-up displayed to user to warn him that images from patient X could not be committed.
0112H	No such object instance	ogged into log file Pop-up displayed to user to warn him that images from patient X could not be committed.
0213H	Resource limitation	Logged into log file Pop-up displayed to user to warn him that images from patient X could not be committed.
0122H	Referenced SOP Class not supported	Logged into log file Pop-up displayed to user to warn him that images from patient X could not be committed.
0119H	Class / Instance conflict	Logged into log file Pop-up displayed to user to warn him that images from patient X could not be committed.
0131H	Duplicate transaction UID	Logged into log file Pop-up displayed to user to warn him that images from patient X could not be committed.

Table 3-2 FAILURE REASON VALUES AND SEMANTICS

7.2.2 DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP
N-EVENT-REPORT	M/M
N-ACTION	M/M

7.2.3 Operations

7.2.3.1 Action Information

Action Type	Action	Attribute	Tag	Requirement Type SCU/SCP
Request	1	Transaction UID	(0008, 1195)	1/1
		Referenced	(0008,	1/1
		>Reference	(0008,	1/1
		>Referencd SOP	(0008, 1155)	1/1

Table 3-3 STORAGE COMMITMENT REQUEST - ACTION INFORMATION

7.2.3.2 Service Class User Behavior

N-ACTION is sent when the images are successfully sent to a remote host declared as Storage Commitment Provider on the Brivo XR118 Acquisition Workstation.

Storage Commitment can be requested for Digital X-ray SOP Class Images For Presentation and For Processing.

Storage Commitment is never requested for images sent to remote host with CR Fallback (see definition in Network Conformance Statement section)

Referenced Study Component Sequence Attribute is not supported.

The transaction UID is applicable until the N-EVENT-REPORT is received. Storage Media File-Set ID & UID Attributes in the N-ACTION are not supported.

When receiving an unsuccessful N-ACTION Response Status Code from the SCP, we log the error in a log file and we display a pop-up to the user.

7.2.3.3 Status Codes

No Service Class specific status values are defined for the N-ACTION Service. See PS 3.7 for general response status codes

7.2.4 Notifications

7.2.4.1 Event Information

Event Type Name	Event Type	Attribute	Tag	Requirement Type
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)	-/1
		Referenced Sequence	(0008,1199)	-/1
		>Referenced Class UID SOP	(0008,1150)	-/1
		>Referenced Instance SOP UID	(0008,1155)	-/1
Storage Commitment Request Complete -Failures Exist	2	Transaction UID	(0008,1195)	-/1
		Referenced SOP Sequence	(0008,1199)	-/1C
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1

		Failed SOP Sequence	(0008,1198)	-/1
		>Referenced SOP ClassUID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Failure Reason	(0008,1197)	-/1

Table 3-4 STORAGE COMMITMENT RESULT - EVENT INFORMATION

7.2.4.2 Service Class User Behavior

When receiving the N-EVENT-REPORT, system looks first for the SOP Instance UID successfully committed. It records them in a log file and flags them in the local database as “Committed”.

Secondly, the system looks for the SOP Instance UID for which the commit failed. It also records them in a log file with the failure reason and display a pop-up to the user.

7.2.4.3 Status Codes

No Service Class specific status values are defined for the N-EVENT-REPORT Service. See PS3.7 for general response status codes.

8. PRINT MANAGEMENT SOP CLASS DEFINITION

8.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

This section contains:

8.2.1 Basic Film Session SOP Class

8.2.2 Basic Film Box SOP Class

8.2.3 Image Box SOP Classes

8.2.4 Printer SOP Class

8.2.5 Print Job SOP Class

8.2.6 Basic Annotation Box SOP Class

8.2.7 Image Overlay Box SOP Class.

8.2 PRINT MANAGEMENT SOP CLASS DEFINITIONS

8.2.1 Basic Film Session SOP Class

The DICOM Print SCU AE supports the N-CREATE DIMSE Service Element for the Basic Film Session SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote

DICOM Print SCP to create an instance of Basic Film Session.

8.2.1.1 IOD Description

1. IOD modules

Module	Referenc	Module Description
SOP Common		Contains SOP Common information
Basic Film Session Presentation	8.2.1.1.2	Contains Film Session presentations
Basic Film Session Relationship	8.2.1.1.3	References to related SOPs

2. Basic Film Session Presentation Module

Attribute name	Tag	Attribute Description
Number of Copies	(2000,0010)	1 to 10 when using Scrapbook Print.
Print Priority	(2000,002	LOW
Medium Type	(2000,0030)	PAPER FILM CLEAR FILM BLUE FILM
Film Destination	(2000,0040)	MAGAZINE PROCESSOR
Film Session Label	(2000,005	Not sent.

3. Basic Film Session Relationship Module

Attribute name	Tag	Attribute Description
Referenced Film Box Sequence	(2000,050	Not sent.
>Referenced SOP Class UID	(0008,115	Not sent.
>Referenced SOP Instance UID	(0008,115	Not sent.

8.2.1.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-SET	Not used
N-DELETE	Used
N-ACTION	Not used

1. N-CREATE

1. Attributes

Attribute name	Tag	Usage SCU
Number of Copies	(2000,00	Used
Print Priority	(2000,00	Used
Medium Type	(2000,00	Used
Film Destination	(2000,00	Used
Film Session Label	(2000,00	Not used
Memory Allocation	(2000,00	Not used

2. Status

Service	Status	Further Meaning	Application Behavior When receiving
Warning	B600	Memory allocation not supported	Association is aborted
Success	0000	Film session successfully created	Next step describe in the sequencing of Real-World

3. Behavior

No specific behavior.

2. N-SET

This service is not used.

4. N-DELETE

This service is not used.

5. N-ACTION

This service is not used

8.2.2 Basic Film Box SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Film Box SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to create an instance of Basic Film Box
- The N-ACTION DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to print the Basic Film Box onto the hard copy printer.
- The N-DELETE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to release the Basic Film Box instance.

8.2.2.1 IOD Description

1. IOD modules

Module	Reference	Module Descripion
SOP Common		Contains SOP Common information
Basic Film Box Presentation Module		Contains Film Box presentation information
Basic Film Box Relationship	8.2.2.1.3	References to related SOPs

2. Basic Film Box Presentation Module

Attribute name	Tag	Attribute Description
Image Display Format	(2010,0010)	STANDARD\1,1
		STANDARD\1,2
		STANDARD\2,1
		STANDARD\2,2
Annotation Display Format	(2010,0030)	Not sent.
Film Orientation	(2010,0040)	PORTRAIT
		LANDSCAPE
Film Size ID	(2010,005)	8INX10IN
		10INX12IN
		10INX14IN
		11INX14IN
		14INX14IN
		14INX17IN
		24CMX24CM
		24CMX30CM
Magnification Type	(2010,0060)	REPLICATE
		BILINEAR
		CUBIC
		NONE
Smoothing Type	(2010,0080)	Only valid for Magnification type = CUBIC
Border density	(2010,0100)	BLACK
Empty Image Density	(2010,0110)	Not sent.
Min Density	(2010,0120)	-1 by default or set to positive integer
Max Density	(2010,0130)	-1 by default or set to positive integer
Trim	(2010,0140)	YES NO
ConfigurationInformation	(2010,0150)	Empty by default or set to a value defined when

3. Basic Film Box Relationship Module

Attribute name	Tag	Attribute Description

Referenced Film Session Sequence	(2010,0500)	Referenced Film Session Sequence
>Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	(0008,1155)	Referenced SOP Instance UID
Referenced Image Box Sequence	(2010,0510)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty
Referenced Basic Annotation Box	(2010,0520)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty

8.2.2.2 DIMSE Service Group

DIMSE Service Element	**Usage SCU**
N-CREATE	M
N-ACTION	M
N-DELETE	Used

1. N-CREATE

a. Attributes

Attribute name	**Tag**	**Usage SCU**
Image Display Format	(2010,0010)	M
Referenced Film Session Sequence	(2010,0500)	M
>Referenced SOP Class UID	(0008,1150)	M
>Referenced SOP Instance UID	(0008,1155)	M
Referenced Image Box Sequence	(2010,0510)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Referenced Basic Annotation Box Sequence	(2010,0520)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Annotation Display Format ID	(2010,0030)	Not used
Film Orientation	(2010,0040)	Used
Film Size ID	(2010,0050)	Used
Magnification Type	(2010,0060)	Used
Smoothing Type	(2010,0080)	Used, not sent if empty or magnification
		is not equal to CUBIC
Border Density	(2010,0100)	Used
Empty Image Density	(2010,0110)	Not Used

Min Density	(2010,0120)	Used, not sent if = -1
Max Density	(2010,0130)	Used, not sent if = -1
Trim	(2010,0140)	Used
Configuration Information	(2010,0150)	Used, not sent if empty

b. Status

There are no specific status codes.

c. Behavior

There is no specific behavior

2. N-DELETE

a. Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Box SOP Instance hierarchy.

3. N-ACTION

N-ACTION is used to print the current film of the film session.

a. Attributes

Action Type Name	**Action Type ID**	**Attribute**	**Tag**	**Usage**
Print	1	Referenced Print Job	(2100,0500)	Not used
		>Referenced SOP Class	(0008,1150)	Not used
		>Referenced SOP	(0008,1155)	Not used

b. Status

Service	**Status**	**Further Meaning**	**Application Behavior When receiving Status**
Success	0000	Film accepted for printing.	Next step describe in the sequencing of Real-World
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances	This case should not happen. This warning is considered as an error. Association is aborted.
Failure	C602	Unable to create Print Job SOP Instance; print queue is full	Appropriate message is returned to the user. Association is aborted.
	C604	Image position collision : multiple images assigned to single image position	Appropriate message is returned to the user. Association is aborted.

	C603	Image size is larger than image box size (by using the specified magnification value)	Appropriate message is returned to the user. Association is aborted.

c. Behavior

SCU uses the N-ACTION to request the SCP to print one or more copies of a single film of the film session.

8.2.3 Image Box SOP Classes

8.2.3.1 Basic Grayscale Image Box SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Grayscale Image Box SOP Class.

- The N-SET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to set the attributes of the Basic Grayscale Image Box Instance.

- IOD description

a. IOD modules

Module	**Reference**	**Module Description**
SOP Common		Contains SOP Common information
Image Box Presentation Module	8.2.3.1.1.2	Contains Image Box presentation information
Image Box Relationship Module		References to related SOPs

b. Image Box Pixel Presentation Module

Attribute name	**Tag**	**Attribute Description**
Image Position	(2020,0010)	1
Polarity	(2020,0020)	NORMAL = pixels shall be printed as specified
		Photometric Interpretation (0028,0004)
		REVERSE = pixels shall be printed with the
		polarity
		as specified by the Photometric Interpretation
		(0028,0004)
Magnification Type	(2010,0060)	Same value as defined in the Film Box.
Smoothing Type	(2010,0080)	Same value as defined in the Film Box
Configuration Information	(2010,0150)	Same value as defined in the Film Box.
Requested Image Size	(2020,0030)	Not Sent
Preformatted Grayscale Image	(2020,0110)	This sequence is always included if the Image
		Basic
		Grayscale Image Box

>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	Original image height
>Columns	(0028,0011)	Original image width
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	Depends on the original image pixel depth (8 or
>Bits Stored	(0028,0101)	Original image pixel depth (8, 10 or 12 bits).
>High Bit	(0028,0102)	Depends on the original image pixel depth (7, 9
>Pixel Representation	(0028,0103)	0 (Unsigned Integer)
>Pixel Data	(7FE0,0010)	

c. Image Box Relationship Module

Attribute name	**Tag**	**Attribute Description**
Referenced Image Sequence	(0008,1140)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
>Referenced Frame Number	(0008,1160)	Not used
Referenced Image Overlay Box Sequence	(2020,0130)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
>Referenced Frame Number	(0008,1160)	Not used
Referenced VOI LUT Sequence	(2020,0140)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used

- DIMSE Service Group

DIMSE Service Element	**Usage SCU**
N-SET	M

a. N-SET

- Attributes

Attribute name	**Tag**	**Usage SCU**
Image Position	(2020,0010	M
Preformatted Grayscale Image	(2020,0110	M
>Samples Per Pixel	(0028,0002	M
>Photometric Interpretation	(0028,0004	M
>Rows	(0028,0010	M
>Columns	(0028,0011	M
>Pixel Aspect Ratio	(0028,0034	1\1
>Bits Allocated	(0028,0100	M

>Bits Stored	(0028,0101	M
>High Bit	(0028,0102	M
>Pixel Representation	(0028,0103	M
>Pixel Data	(7FE0,001	M
Polarity	(2020,0020	Used
Referenced Overlay Sequence	(0008,1130	Not used
>SOP Class UID	(0008,1150	Not used
>SOP Instance UID	(0008,1155	Not used
Configuration Information	(2010,0150	Used, not sent if empty
Magnification Type	(2010,0060	Used
Smoothing Type	(2010,0080	Used, not sent if empty or magnification is not
		CUBIC
Requested Image Size	(2020,0030	Not used

- Status

Service	**Status**	**Further Meaning**	**Application Behavior When receiving**
Failure	C605	Insufficient memory in printer to store the image	Appropriate message is returned to the user. Association is aborted.

- Behavior

There is no specific behavior.

The SCU does not instruct the SCP to erase the image in the image position by setting a zero length and no value in the Attribute Preformatted Grayscale Image Sequence (2020,0110) or Preformatted Grayscale Image Sequence (2020,0111)Printer SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Printer SOP Class.

The N-EVENT_REPORT DIMSE Service element sent by the DICOM Print SCP to the local DICOM Print SCU AE. The DICOM Print SCU handles the Printer Status and Printer Status Info fields. All other received data are ignored.

The N-GET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to give information on the Remote DICOM Printer.

8.2.3.2 IOD Description

1. IOD modules

Module	**Reference**	**Module Description**
SOP Common		Contains SOP Common informationM
Printer Module	8.2.4.1.2	Contains status information to monitor the printer

2. Printer Module

Attribute name	Tag	Attribute Description
Manufacturer	(0008,0070)	Printer shall return value
Manufacturer Model Name	(0008,1090)	Printer shall return value
Device Serial Number	(0018,1000)	Printer shall return value
Software Versions	(0018,1020)	Printer shall return value
Date Of Last Calibration	(0018,1200)	Printer shall return value
Time Of Last Calibration	(0018,1201)	Printer shall return value
Printer Status	(2110,0010)	The behaviour defined for the following term NORMAL : Association goes on. FAILURE : Association is aborted. WARNING : Association is released except if Printer Status Info is: SUPPLY LOW SUPPLY EMPTY
Printer Status Info	(2110,0020)	The behaviour is defined for SUPPLY LOW and SUPPLY EMPTY (See upwards)
Printer Name	(2110,0030)	Printer shall return value

8.2.3.3 DIMSE Service Group

DIMSE Service Element	**Usage SCU**
N-EVENT-REPORT	M
N-GET	U

1. N-EVENT-REPORT

a. Attributes

Event Type Name	**Event Type ID**	**Attribute**	**Tag**	**Usage SCU**
Normal	1			
Warning	2	Printer Name	(2110,0030)	
		Printer Status Info	(2110,0020)	
		Printer Name	(2110,0030)	

Failure	3	Printer Status Info	(2110,0020)	

Note: The N-EVENT-REPORT default timeout is set to 30 secs.

b. Behavior

If {Printer Status} is FAILURE

Signal print FAILURE to the user, association is aborted

Else

Signal print SUCCESS to the user

2. N-GET

a. Attributes

Attribute name	**Tag**	**Usage SCU**
Manufacturer	(0008,0070)	Used
Manufacturer Model Name	(0008,1090)	Used
Device Serial Number	(0018,1000)	Used
Software Versions	(0018,1020)	Used
Date Last Calibration	(0018,1200)	Used
Last Calibration	(0018,1201)	Used
Printer Status	(2110,0010)	Used
Printer Status Info	(2110,0020)	Used
Printer Name	(2110,0030)	Used

b. Behavior

If Printer Status is FAILURE Signal print failure to the user Else

Signal print success to the user

8.2.4 Print Job SOP Class

This SOP Class is not supported by this implementation.

8.2.5 Basic Annotation Box SOP Class

This SOP Class is not supported by this implementation.

8.2.6 Image Overlay Box SOP Class

This SOP Class is not supported by this implementation.